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ABSTRACT

This document reviews the state of medical and dental education in Texas, 1974-80. Recommendations suggest: (1) The Advisory Committee and the Task Force for Medical and Dental Education would be continued as planning bodies to be convened at least once every two years. (2) No new medical or dental schools are recommended since the state will be able to meet current demands for medical and dental manpower if: (a) the trends of the past six years continue, and (b) the presently approved medical and dental schools are expanded to their currently approved optimum capacities. (3) Increased State of Texas support is recommended to continue augmentation of primary care education in all Texas medical schools for undergraduate medical students, and resident physicians in hospitals and in other clinical facilities. Working papers in the document deal with additional manpower, medical and dental school admissions, underrepresentation of minority students in medical and dental schools in Texas, curricula and educational methodologies, cost and financial implications, and future studies. (MJM)

ED 100233

THE HEALTH OF TEXANS

A Study of Medical and Dental Education 1974-1980

CB Study Paper 23

U.S. DEPARTMENT OF HEALTH,
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Final Report
of the
Advisory Committee and Task Force
on Medical and Dental Education

Presented to
Coordinating Board, Texas College and University System
October 18, 1974

HE 006 133

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Coordinating Board, Texas College and University System
LBJ Building • P.O. Box 12788 • Capitol Station
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November 1974

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FOREWORD

The Coordinating Board, Texas College and University System, in two 1968 policy papers, adopted a series of recommendations concerning medical and dental education. The Board also recommended the updating of these studies within five years.

To carry out that directive, the Board in January 1973 appointed an Advisory Committee and a complementary Task Force. Distinguished lay persons, medical and dental practitioners, educators and administrators in both fields were asked to update the policy papers, to project educational and health manpower needs, and to identify areas of change which would keep Texas medical and dental schools in the forefront of the nation's health professions institutions. These Texas citizens responded conscientiously and enthusiastically to their charge from the Coordinating Board.

Members of the Task Force and special consultants provided necessary background materials upon which the Advisory Committee could base its recommendations. For twenty months, Advisory Committee members gave of their time and talent to study and analyze the accumulated information in order to offer to the Coordinating Board an impressive set of recommendations. The recommendations encompass most aspects of medical and dental education, from admissions procedures to financial implications. The emphasis during the study was placed on the health of Texans and on appropriate educational opportunities for the people of the state.

The members of these two groups, assisted by the Coordinating Board staff, particularly Dean Herbst, have produced a report which we believe will have continuing impact on medical and dental education throughout this decade. The report was presented to and accepted by the Coordinating Board at its meeting on October 18, 1974.

The Board is pleased to present the report as one of its study paper series. The Board's study papers make available to the Texas academic community, to members of the executive and legislative branches of Texas government, and to interested citizens the results of education research projects undertaken by or for the Board.

The Coordinating Board and its staff express appreciation to the Advisory Committee and Task Force on Medical and Dental Education, and to the special consultants for this important contribution to the work of the Board.

BEVINGTON REED
Commissioner of Higher Education

PREFACE

An Advisory Committee and a Task Force on Medical and Dental Education were appointed in January 1973 by the Coordinating Board, Texas College and University System. The two groups were named to undertake an in-depth study of medical and dental education in the State of Texas. They were asked to update the 1968 Coordinating Board recommendations and to project the future needs and responsibilities of education in these two major fields for the next decade.

The Advisory Committee, chaired by Dr. Bernice Milburn Moore, Executive Associate of the Hogg Foundation, was made up of medical doctors, doctors of osteopathic medicine, dentists, and distinguished citizens selected from the general public. The Coordinating Board designated the committee as the group which would ultimately vote and make its recommendations to the Board.

Dr. William H. Knisely, Assistant to the Chancellor for Health Affairs, The University of Texas System, was elected chairman of the second group, the Task Force on Medical and Dental Education. The Task Force was composed of representatives from each existing public and private medical and dental school in Texas, and from institutions proposing new programs. The purpose of the Task Force was to identify and provide the kinds of information which would be of assistance to the Advisory Committee in making its recommendations.

Special consultants were invited to participate in certain areas of study to assist the two primary groups in gathering information.

After the two groups began their study, Senate Resolution 209, passed by the 63rd Legislature of the State of Texas, directed the Coordinating Board to reexamine all areas of higher education in the state. This

resolution underscored the need for reevaluating future developments in the vital but high-cost fields of professional education. (See S.R. 209, Appendix A.)

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EDUCATIONAL GOALS AND OBJECTIVES FOR MEDICINE AND DENTISTRY

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EDUCATIONAL GOALS AND OBJECTIVES FOR MEDICINE AND DENTISTRY

> "Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity."[1]

To establish goals and objectives for the education of health professions in Texas for the next decade requires the formulation of goals and objectives for health care delivery, along with methods of appropriate evaluation.

Because economic, political, and intellectual strengths of a people are directly related to effective and efficient maintenance and utilization of physical and mental health, each citizen of Texas must have a reasonable access to the best possible health care from sufficient numbers of practitioners and at a cost which will not be a barrier to utilization. With the privilege of receiving health care also goes the challenge to educate all individuals to avoid the neglect and/or abuse of their own health.

Principal goals to be accomplished to assure an acceptable level of health care for Texas include:

- Reasonable and timely access by each individual to appropriate health care resources
- Assurance that illness and health care will not result in financial disaster for an individual or family
- Public education for purposes of health maintenance and prevention of illness

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[1]World Health Organization's definition of health, as cited in Dorland's Illustrated Medical Dictionary (24th Edition; Philadelphia: Saunders Publishing Co., 1965).

Obtaining these goals will require a significant reorientation in thinking. No longer is it a legitimate assumption that a mere increase in the supply of physicians and dentists will solve the problem of making high quality health care available.

Realistic plans must be developed for the dispersal of health care services, including redistribution of health service resources, geographically, by primary health care professionals, and by specialties. Greater emphasis must be placed on the education and training of physicians and dentists to practice primary care and on the utilization in changing roles of paraprofessional personnel, as well as the uses of new technologies.

National, state, and local leaders, in addition to physicians and dentists, must give attention to the many factors contributing to poor health which are peripheral to medical and dental practices, and therefore peripheral to professional education per se. These include inadequate housing, poor nutrition, self abuse through excessive or inappropriate use of alcohol, tobacco, and other drugs, and damaging environmental stimuli.

Achievement of Goals

Goals and objectives for medical and dental education are an important part of the overall health care objectives needed to maintain the health of the citizens of Texas. First, to achieve the best possible level of health requires the prevention of all possible illness, diseases, and accidents. Second, it demands care and cure for those who become ill or injured. Third, this care and cure must be offered as rapidly and effectively as possible.

Briefly, the objectives of all health professional education include:

- Improvement of the health status of Texans
- Assistance in making health care available to all Texans who require it

- Efforts to insure that the care given is of the highest possible quality

To accomplish these goals and objectives, the following must be pursued:

- Education of an adequate number of physicians, dentists, and their assistants
- Productivity of physicians, dentists, and their assistants maximized by:
  a) Education of appropriate numbers and types of paraprofessional personnel to assist in the provision of care
  b) Team participation by physicians and dentists with other health professionals and assistants
  c) Continuing education for all practitioners and their assisting paraprofessionals
  d) Recertification and/or reexamination

The Coordinating Board should join other planning groups in striving to foster and encourage educational programs and activities which will:

- Enable physicians, dentists, and other health professionals to maintain health, to prevent illness, and to cure disease
- Enable hospitals, nursing homes, and other health care institutions to render the highest quality of medical, dental, and total health care possible

Primary Objective and Goal

The primary objective and goal of medical and dental education in Texas is the training of adequate numbers of physicians and dentists, at a high level of competence, required to insure adequate health care delivery to the people of the state. Appropriate specialty percentages optimally distributed

throughout the state are also a requirement of the educational process.

To predict the future needs of educational resources in medicine and dentistry, both foreseeable "demands" and anticipated "needs" must be projected. Effective demand for the obtaining of health care is closely related to both educational level and to income. Because many people who need health care have been unable to "demand" it for a variety of reasons, previously unmet needs must also be considered. Public awareness of health care services is increasing as effective payment plans proliferate. "Demand" will inevitably rise, more closely approaching "need."

Estimation of the required adequate number of practitioners must be qualified in several additional ways. The number of physicians needed will be interdependent with the number of assistants who are trained to work cooperatively with them. The number of dentists needed will be related to the number of hygienists and assistants trained to work cooperatively with dentists. A further consideration relates to legal constrictions on permissible activities by the various types of assistants. Projections are made elsewhere in this report which take into account some of the variables related to these unknowns.

Ideal Class Size

To educate the necessary number of practitioners, it is estimated that, for efficiency and economy, a minimum number of students per class in a school of medicine or dentistry is 100. No significant gain in quality education has been shown to be obtained beyond a total of 200 students per class.

- It is recommended that the objective, stated in the 1968 Coordinating Board study of medical education, of 200 students in the entering classes of each state-supported medical school be continued as a policy.

- It is recommended that when additional students beyond 200 per entering class in the existing school are needed, the advisability of establishing new schools should be investigated.
- It is recommended that along with other relevant factors, geographic considerations be taken into account in the establishment of any new state-supported schools to avoid overproliferation of such schools in any given urban area of the state.

Training for Team Practice

Medical and dental education in Texas should train physicians, dentists, and other health professionals to work cooperatively in team relationships for the benefit of patients. Professional education in "team care" seldom has been carried out specifically to teach the various types of professionals and their assistants to work together. This has been partially a consequence of the geographic separation of health professions schools.

Research on team approaches to health care in varied settings is essential in the present health education environment and should be developed in cooperation with practitioners and among the several health professions. Settings should include the more usual areas of need: middle-sized cities, ghettos, and widely dispersed rural areas. Some teams should include Spanish-English bilingual members to function in areas of Texas with large Spanish-speaking populations.

Adequate staff and financial support for continuing education programs is a goal increasingly recognized for physicians, dentists, and their assistants to assure ongoing formal training throughout their practicing careers, including the incorporation of new information and techniques into their practices.

Professional societies are taking steps to link continuing education with recertification. For example, professional organizations of both M.D.'s

and D.O.'s have recently accepted the concept of recertification, and a number of these already have adopted the requirement of reexamination for recertification.

Geographic Distribution

Need for physicians, dentists, and other health professionals is directly related to geographic distribution. Health professionals, like most other Americans when they have a choice, tend to accumulate in large city suburbs and in medium-sized cities and towns. They tend to avoid large city ghettos and thinly populated rural expanses.

Motivation for the redistribution of practice locations into areas of need should be a particular concern of health professional education. Arbitrary redistribution runs counter to other factors concerning locations of practice and of living. Cities have been created by people moving from country and rural areas. Nonetheless, rural areas still require their share of health professionals. City ghettos and other disadvantaged areas also have increased health needs accompanied by decreasing health care services available to them. Stimuli must be provided for practice in these areas.

Health professionals tend to remain where they are at the conclusion of their formal education or to return to places where they have lived previously. Some practitioners can be expected to return to the location of their residence during high school, college, or medical school. Research studies have shown that one of the greater determinants in selecting a practice location is the final site of graduate study.

Four recommendations would serve to help alleviate the program of geographic maldistribution of health care delivery in Texas:

- Some period of training should be provided in areas of need to attract practitioners who have lived in those areas.

- Clinical facilities for graduate training should be provided in regions in the state which are underserved by the health professions.
- Tuition, scholarship incentives, and/or loans should be made available under community contractual arrangements with underserved areas which would draw students from areas of need and guide graduates into practice in areas of health care shortages for a given period of time early in their careers.
- Cooperative efforts should be expanded among the Texas Medical Association, the Texas Osteopathic Medical Association, the Texas Dental Association, and the medical and dental schools to maintain a broad-based, up-to-date information service on practice opportunities throughout the state. This service should be built upon the excellent existing organization funded and operated by the Texas Medical Association.

The TMA, for more than 25 years, has maintained an active program, the Physicians' Placement Service, to assist communities in securing physicians, and to encourage physicians to locate in areas of need. Two publications are prepared every other month: "Physicians Seeking Locations in Texas" and "Opportunities for Practice in Texas." Physicians seeking locations receive the list of opportunities. Communities seeking physicians and physicians seeking associates receive the list of individuals available for practice. This service is provided without charge. Medical schools are furnished copies of the opportunities list, and seniors in each medical school are given information about the placement service before graduation.

Specialty Distribution

Equally pressing is the problem of maldistribution of medical and dental specialties in the state. To respond to the changing needs for given numbers of specialists and in particular areas, rapid flexibility in the magnitude and kinds of graduate training opportunities will be necessary. For example, if preventive oral health care is effective in significantly reducing the occurrence of dental caries, a shift to other dental specialties may be indicated. The decline in percent of general practice and other primary care physicians has brought about a renewed emphasis on the education of family practitioners. Several programs in medical schools stressing family practice medicine, as well as in internships and residencies, already have been established in Texas. These programs and those in internal medicine, pediatrics, and obstetrics and gynecology -- all at the primary care level -- should receive support and encouragement. However, in the future, the state may again need to shift emphasis to or from given specialties.

Social Responsiveness

Inclusion of courses in the humanities and social sciences before admission to medical or dental school is essential for understanding of the whole person and his environment and is recommended. Reinforcement of such studies within the professional curricula at medical and dental schools should be carried out.

Physicians, dentists, and other personnel working in health care institutions frequently have provided services for poor and indigent persons as a philanthropic effort. However, in the practice of medicine and dentistry, significant health care needs require social responsiveness and humane sensitivities above and beyond those required in most professions. Selection of students for these professions should take into account social responsiveness.

Health preservation and the prevention of illness, as much as the treatment of disease, should be included in the curricula of professional schools. It is an unfortunate fact in American medical and dental education that the "health of the public" (public health) was neglected in medical education in the early part of the century to the degree that men like William Henry Welch found the best solution of this dilemma to be the creation of new and separate schools.

The expertise of professors and research personnel in medical and dental schools should be made available to assist in the preparation of curricular and other educational materials on nutrition, hygiene, the maintenance of health, and other factors subject to personal control. Such materials should be available to children and youth, young adults, middle-aged, and elderly, as well as to practitioners participating in continuing education.

Biomedical Research

Biomedical research, in the main, is carried out in academic centers with medical schools at the present time. Studies show a definite relationship between medical research and the quality of medical education. In addition to the effect of ongoing research on curricular offerings and on teaching methods of medical schools, the research atmosphere provides better-educated practitioners. Research programs attract creative people to the teaching and practice of medicine and to other areas of the health field.

Planned programs of research in better methods of health care and delivery are recommended in each of the medical and dental schools in Texas. Medical and dental students involved in some aspects of research have sharpened their ability to reason critically. And their capacity is increased to adopt new methods of health care delivery, as well as to stimulate adoption of new techniques and equipment as these become available during their careers in practice.

Recommendations concerning biomedical research were made by an Ad Hoc Committee of the Council of Academic Societies of the Association of American Medical Colleges. A summary of conclusions and recommendations from this report is included as Appendix C.[2]

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[2]Association of American Medical Colleges, A Policy for Biomedical Research, Report of an Ad Hoc Committee of the Council of Academic Societies, AAMC, reprinted from Journal of Medical Education (Washington, D.C.: August, 1971).

SUMMARY OF RECOMMENDATIONS

SUMMARY OF RECOMMENDATIONS

FUTURES PLANNING

- The Advisory Committee and the Task Force for Medical and Dental Education should be continued as planning bodies to be convened at least once every two years.

- The present report should be reexamined no later than 1978 in light of possible increase or decrease in:

  a) Demand and utilization of medical and dental services

  b) Number and scope of prepayment plans, including national health care programs

  c) Population in given areas of the state

SUPPLY OF PHYSICIANS AND DENTISTS

- No new medical or dental schools are recommended at this time.

  a) The state will be able to meet current demands for medical and dental manpower if:

     1) Trends of the past six years continue

     2) The presently approved medical and dental schools are expanded to their currently approved optimum capacities

  b) These institutions which have been approved for expansion or are currently developing include:

     The University of Texas Medical School at Houston

     The University of Texas Medical School at San Antonio

     The Texas Tech University School of Medicine

     The Texas A&M / Baylor College of Medicine program, as approved by the Coordinating Board, April 13, 1973

     The Texas College of Osteopathic Medicine / North Texas State University combination as recommended to the Coordinating Board by the Advisory Committee on Medical and Dental Education on March 10, 1973 [1]

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[1]The Advisory Committee on Medical and Dental Education recommended at its March 10, 1973, meeting "Coordinating Board approval of the request from North Texas State University in conjunction with the Texas College of Osteopathic Medicine for a Department of Basic Health Sciences and a new degree program in Basic Health Sciences, provided that TCOM and NTSU agree to study a plan for consolidation of all educational activities of these two institutions into a School of Osteopathic Medicine as a part of NTSU and to report the results of their study to the Coordinating Board by January 1, 1974." A joint committee from these two institutions is now working on this plan for permanent affiliation.

The University of Texas Dental Branch at Houston

The University of Texas Dental School at San Antonio

The Baylor College of Dentistry at Dallas[2]

- Medical education, undergraduate and graduate, should be planned to decrease significantly dependence upon foreign medical schools for provision of health care within the State of Texas.

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[2]Need for dental manpower should be reexamined on the basis of findings in a study being made by Leonard Davis Institute of Health Economics, University of Pennsylvania, 3641 Locust Walk, Philadelphia, PA, 19174, commissioned by the Board of Trustees of the American Dental Association and due for release in the summer of 1975.

PRIMARY CARE

- Increased State of Texas support is recommended to continue augmentation of primary care education in all Texas medical schools for:[3]

  a) Undergraduate medical students

  b) Resident physicians in hospitals and in other clinical facilities

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[3]Primary care is interpreted to include general practice, family practice, internal medicine, pediatrics, and obstetrics and gynecology and represents the single greatest deficiency in numbers.

DISTRIBUTION OF MEDICAL AND DENTAL MANPOWER

- The State of Texas should provide immediate funding for House Bill 683, the State Rural Medical Education Act, passed by the 63rd Legislature for:

  Loans, grants, or scholarships for those desiring to study medicine and agreeing to practice in rural areas.

- Other funds should be made available for tuition and/or scholarships for students from areas without adequate medical and dental professionals who will agree to return to practice in places of health care shortage for a given period of time early in their careers.

- Financial and other incentives should be considered for physicians and dentists, recently graduated from medical and dental schools, who will agree to practice in under-served central cities or rural areas for two or more years.

- Medical and dental schools are urged to assume initiative and exercise leadership in helping interest young practitioners in areas of need in Texas.

- Medical and dental schools should further address the problem of a more equitable distribution of physicians and dentists in inner cities and rural counties by:

a) Introduction of a system of supervised training programs during summer and other off-campus periods in underserved areas

b) Establishment of hospital and other clinical facilities for graduate training in communities and regions deficient in supply of physicians and dentists

c) Inclusion in budgets of medical and dental schools of matching appropriations from communities in a ratio commensurate with the education-service roles of the involved institutions

d) Instigation of especially designed professional courses for physicians and dentists with other health professionals in team care relationships for underserved areas

e) Development of research studies on team delivery of health care services in areas of professional deficiency

- Each medical and dental school should assume primary responsibility for these suggested programs for a particular region.

- A broad-based and comprehensive information service on practice opportunities should be developed, utilizing the already existing 25-year-old Texas Medical Association center through:

a) Cooperation between the Texas Medical Association, Texas Osteopathic Medical Association, Texas Dental Association, and the medical and dental colleges in the state

b) Possible development of a computerized, easy-access information storage and retrieval system at the Texas Medical Association state headquarters working in collaboration with the Computation Center at The University of Texas at Austin

MEDICAL AND DENTAL SCHOOL ADMISSIONS

A Statement of Principle

The quality of physicians or dentists graduated from medical and dental schools is dependent upon both their personal attributes and their intellectual capacities. Practitioners must be secure enough to accept patients and their problems without exploiting them or being frightened by them. Selection of students from applicants for attendance at medical and dental schools is of the utmost importance.

The greatest need in the health professions today is for people-oriented, service-dedicated practitioners. Those chosen to become students from the pool of academically qualified must be well rounded and secure. Attributes such as motivation to serve, integrity, empathy, strength of interpersonal relationships, maturity, emotional stability, and diligence are essential. Persons with these characteristics can be educated in the requisite skills and techniques which are basic to their professions.

Therefore, it is recommended that:

- Medical and dental schools in Texas should weigh carefully personal attributes of applicants as well as their intellectual ability, educational background, and record of achievement.

- Assessment of the qualities of personality should be made through comprehensive interviews conducted by selected practitioners in collaboration with medical and dental educators, each trained and skilled in interviewing techniques. This combination would assure ample input in choice of students by practicing physicians and dentists in cooperation with medical and dental educators.

- Medical and dental schools in Texas should undertake with the assistance of outstanding test and measurement psychologists, the development and validation of tests for measurement of noncognitive attributes insofar as possible of medical and dental school applicants

- The major importance of counseling of premedical and predental students in universities and colleges should be further recognized in time allocation and sufficient funding for such counselor services.

- Increased numbers of applicants to medical and dental schools should be actively stimulated from well prepared women and minority group members.[4]

- Medical and dental schools of The University of Texas System, Texas Tech University School of Medicine, Baylor College of Medicine, Baylor College of Dentistry, Texas A&M University, and the Texas College of Osteopathic Medicine should consider the establishment of a single application center for all Texas-resident medical and dental school applicants, leaving the final choice of students to each institution through interviews of separate colleges, in order to:

  a) Eliminate duplication of effort

  b) Reduce multiple costs

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[4]See the report and recommendations of the special subcommittee on Underrepresentation of Minority Students in Medical and Dental Schools in Texas, appointed by the Commissioner for the Coordinating Board, Texas College and University System, November 1, 1973, pp. 35-49 and pp. 139-149 of this report.

UNDERREPRESENTATION OF MINORITY STUDENTS IN MEDICAL AND DENTAL SCHOOLS IN TEXAS

An Overview

Preparation of Blacks and Mexican Americans for entry into medical and dental schools must begin early in life. Traditionally these groups are underrepresented in health professional schools. Encouragement, especially at the secondary school level, is necessary to assure them that they can succeed in the medical and dental professions.

The idea of becoming a physician or dentist among these high school students is remote. This attitude is based in part on financial resources, lack of role models, and insufficient counseling.

In addition, many Mexican Americans and Blacks will graduate from high school with a deficiency in reading -- a deficiency often not overcome in college. Short-term crash programs cannot correct years of inadequate education and preparation. Intensive programs of remedial studies are not a solution to the problem, though helpful in the short run.

The whole question of quality career counseling and preparation at each level of education -- junior high through college -- should be examined. Special attention should be given to

motivational and learning needs of qualified minority students of both sexes who are interested in entering medical and dental professional education programs. Such an examination of counseling requirements through the cooperative effort of the Texas Education Agency and the Coordinating Board would be a mark of genuine encouragement to the minority groups as well as to women in the state.

Some assumptions on health and dental care delivery to ethnic minority groups and the training of minority health and dental care practitioners can be made:

- Less accessibility in Texas to quality health care delivery exists for minority groups.
- Underrepresentation of practicing Black and Mexican American physicians and dentists as compared to the percentage of these ethnic groups in the total population is present.

Certain facts in support of these basic assumptions include:

- Too few Blacks and Mexican Americans apply for admission to medical and dental schools.

- Many who do apply present credentials too low to compete successfully with other applicants for admission.

- Percentage of Black and Mexican American graduates of medical and dental schools is lower than the percentage of persons of these origins in the total state population.

Answers to the question of why these apparent inequities exist in number of applicants, variations in academic preparation, and number of graduates were sought.

- Family discouragement, lack of role models, and other societal influences tend to prevent Blacks and Mexican Americans from seeking careers in medicine or dentistry.

- Previously segregated schools provided poorer educational opportunities in the past, contributing to the less promising credentials presented by Blacks and Mexican Americans seeking admission to medical or dental schools.

- Many potentially qualified students do not realize that they may be capable of success in health professional schools. Inadequate counseling services

through the educational continuum (elementary school through college) undoubtedly prevent many from succeeding who could pursue careers in dentistry and medicine.

- Fewer Blacks and Mexican Americans are found among graduates of Texas universities and colleges than the proportion of these ethnic groups in the total state population. This contributes directly to the lack of qualified applicants to medical and dental schools.

- Higher attrition among Mexican Americans and Blacks is found throughout the educational continuum.

- For those ethnic minority students who do graduate from college, frequent job opportunities at the time of graduation may cause large numbers of them to choose immediate employment rather than further professional training.

- The cost of four additional years of education following the baccalaureate degree is so great that it may not be economically feasible for students from low-income groups to continue into professional training. Substantial financial assistance other than loans is required.

- Competition for academically talented minority graduates is nationwide. Offers of admission to these highly qualified students from out-of-state schools are frequently accompanied by generous scholarships.

On the basis of these possible answers, the following recommendations are submitted:

- A study should be commissioned by the Coordinating Board to determine ways of early identification and continuous motivation of capable minority students and those from high schools in underserved areas toward continuation of rigorous studies required to compete successfully for admission into and completion of medical and dental education. This study should include:

  a) A design for model programs to strengthen career counseling and preparation of minority and other students throughout elementary, junior and senior high school years in cooperation with the Division of Counseling and Guidance of the Texas Education Agency

  b) A plan for consistent counselor encouragement for these youth, especially from minority groups, to enter medical and dental professions

c) An expansion of data banks and information systems, with additional data collection on minority group students, as now being developed by the Texas Education Agency and the Coordinating Board, so that knowledge of students from target groups becomes readily available

- Undergraduate colleges and universities should be urged to upgrade and expand counseling activities so that qualified counselors will:

  a) Provide coordination between high school and college counselors and with health professions schools' admissions committees
  b) Identify potentially successful students
  c) Provide alternative career choices for students with less aptitude who are interested in health professions
  d) Expand information exchanges and discussion programs, already established on a voluntary basis, between admissions personnel of health professional schools and undergraduate counselors[5]

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[5]This recommendation is applicable to all potential students for health professional schools, and especially for those from high schools in smaller communities.

- Probability of minority students and those from smaller community high schools successfully meeting the academic and emotional demands of rigorous medical and dental education programs should be increased by instructional techniques and support services to:

  a) Accommodate different rates of learning
  b) Increase reading and study skills
  c) Overcome deficiencies in academic preparation

- Services for minority group students as listed above, especially, should be designed as a part of a total environment of support, responsive to special incentive and motivational needs of students whose backgrounds have not included positive role models and historic success.

- Special funding should be made available to cover the cost of providing additional faculty members, equipment and supplies, tutorial assistance, and enrichment programs for minority group members.

- Student loan programs and increased financial assistance in the form of scholarships and fellowships should be made available to needy minority group medical and dental students, and

- Existence of such aid should be made widely known to encourage able but needy individuals to continue their training through and beyond the baccalaureate degree level.

- Efforts should be initiated to prepare and recruit minority group members and women for instructional positions in medical and dental institutions.

CURRICULA AND EDUCATIONAL METHODOLOGIES

- Maintenance of health and prevention of illness, as well as treatment of disease, should be given increasing emphasis in the curricula of medical and dental colleges.[6]

- The humanities, behavioral and social sciences should be given increased attention in:

  a) Premedical and predental education in undergraduate colleges and universities

  b) Additional course offerings in medical and dental colleges as reinforcement

- Modular curricula at the honors level for premedical and predental students should be developed.

- Open curricula with students as participants at various levels of health care delivery systems should be developed in health care professional schools including:

  a) Economic utilization of existing resources

  b) Placement of health manpower where needed

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[6]This should be complementary to the support of the development of intensive programs in health education from primary grades through college, working in cooperation with Texas Education Agency and health education departments of colleges and universities.

c) Modular self-directed approaches for students to program their progress at their own rate and ability

d) Performance objectives identified for each phase of the curriculum

- Because involvement of medical and dental students in research develops their ability to reason critically and increases their capacity to adapt new methods of health care delivery following graduation, each medical and dental school in Texas should include planned and state-funded programs of research and adequate library facilities in the various areas deemed essential by the medical and dental institutions.

- Instructional development teams composed of faculty members and other professionals should be organized and financed to:

  a) Enhance present instructional methods

  b) Develop new instructional systems

  c) Evaluate instructional programs

- Alternative educational methods, including self-instructional packages, should be explored to:

  a) Reduce investments in physical plants

  b) Increase efficiency in use of classrooms and other physical facilities

- Financial support should be made available for the development of cooperative sharing of information and materials for the advancement of teaching and research programs in all Texas health science education centers.

- Continuing education programs especially designed for physicians and dentists should be expanded and/or offered by each health professions school.

- Such continuing education programs should be taught by faculty and support personnel from health science educational centers along with qualified practitioners in all regions of the state.

COST AND FINANCIAL IMPLICATIONS

- Health professional schools should be regarded as state and national resources deserving state and federal support.

- The State of Texas should establish a sustained level of fiscal support for medical and dental education. This should include costs of:

  a) Research
  b) Clinical training
  c) Teaching hospital differentials
  d) Administration
  e) Other essentials to such training
  f) Planning and production of staff programs of continuing education for health practitioners

- Educational components of teaching hospitals, rural and urban, viewed as state training resources, should be financed by state funding, taking into account the differential cost in health care when hospitals are utilized for medical and dental education functions.

- State officials should support federal capitation grant programs to help provide stable financial bases for health professional schools.

- Capitation grants should be considered an appropriate complement to income from tuition, gifts, and appropriations by the state government.

- Capitation grants should include:

  a) Allocations based upon number of graduates instead of total enrollment

  b) Appropriate transitional funding for schools with greatly increased enrollments in the past few years

FUTURE STUDIES

- The Coordinating Board should be authorized to undertake studies of:

  a) Classification, various roles, expanded duties, and legal aspects of auxiliary support personnel for physicians and dentists

  b) Rising costs of medical and dental education to assure maximum effectiveness for dollars expended

COMMENTS OF JOHN D. WILBANKS, D.D.S.[7]
ON DENTAL SCHOOL ENROLLMENTS

There is no reason to believe that we will need as many dentists as are now projected, while there is reason to believe an increase from 182 graduates in 1972 to over 400 in six years is substantially more than we will need and in addition a heavy burden on the taxpayers. I suggest that the Coordinating Board review the present enrollment schedule at our dental schools.

At a cost of over $14,000.00 per student, per year, I think we are being less than responsible if we fail to note this and bring it to the attention of the Coordinating Board.

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[7]Advisory Committee member, in a letter to Bernice Milburn Moore, Chairman, Advisory Committee on Medical and Dental Education, September 20, 1974, and included at the personal request of Dr. Wilbanks.

PROGRESS TOWARD IMPLEMENTATION OF
1968 COORDINATING BOARD RECOMMENDATIONS

PROGRESS TOWARD IMPLEMENTATION OF
1968 COORDINATING BOARD RECOMMENDATIONS

Ten recommendations relative to priorities and needs of medical education in the State of Texas from 1969 to 1980 were made in 1968 by the Coordinating Board as the result of a special study. These recommendations, presented to the Governor and the Legislature, were published as Coordinating Board Policy Paper 5, A Proposal for the Development of Medical Education in Texas, 1969-1980.

Dental education was investigated at the same time. Seven recommendations were adopted by the Board and transmitted to the Governor and the Legislature. These recommendations and the accompanying study were published as Coordinating Board Policy Paper 6, Dental Education in Texas.

A review of both sets of recommendations gives good indication of the importance of forward-looking, thoughtful studies of professional education and the importance placed on them by the Governor and the Legislature. Most of the recommendations made in 1968 have been implemented. Others are in the process of implementation and will be completed before 1980.

The ten recommendations concerning medical education and the present status of implementation are as follows:

1. Entering enrollments in the existing public medical schools of The University of Texas should be steadily increased. Planning, to include all requirements for such increases, should be undertaken at once.

At the time of the 1968 report, the three existing state-established medical schools in The University of Texas System were The University of Texas Medical Branch at Galveston, The University of Texas Southwestern Medical School at Dallas, and The University of Texas Medical School at San Antonio. A comparison of entering class sizes in 1968, 1972, and 1974 is as follows:

	1968	1972	1974
UT Medical Branch	163	204	203
Southwestern	105	128	200
UT San Antonio	56	116	122
Total	324	448	525

The total increase in entering class size from 1968 to 1974 at all three institutions was sixty-two percent.

Projections made in 1968 were entering class sizes of 200 or more at each of the three schools in existence at that time: i.e., Southwestern, 200; Medical Branch, 203; and San Antonio, 200. However, present curtailments of federal funding which would have enabled further enrollment increases make projected figures in 1980 uncertain for entering class enrollments.

If full funding is available, entering class enrollments at the three schools will surpass the Coordinating Board recommendation of "no fewer than 565 entering students." If funding is not available, projected entering class enrollments are approximately 40 students less than the recommended figure.

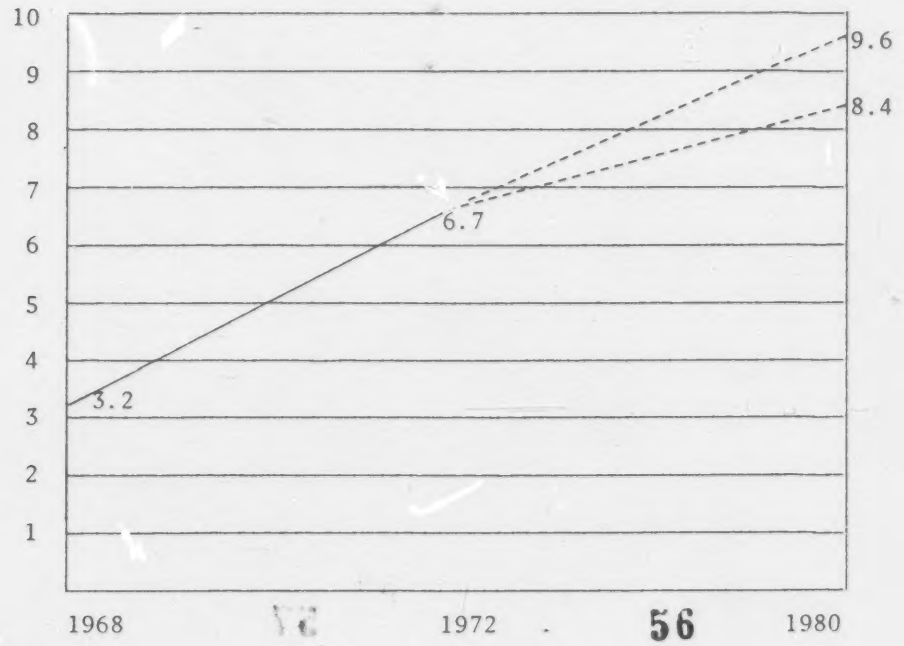
2. The Baylor University College of Medicine in Houston should be encouraged to implement its plan to double its entering class enrollment. The Baylor College of Medicine should be offered subsidization by the state for each bona fide Texas resident enrolled beginning in September, 1969, the amount of subsidization per student to approximate the average annual state tax support per student at the public medical schools. Assistance should be provided to the college to raise the capital funds necessary for construction of physical facilities to accommodate increased enrollments. The purpose of the subsidization is to increase enrollment of Texas resident medical students.

Entering class enrollment at Baylor College of Medicine in 1968 was 84. In 1972 that number rose to 168, double the beginning class in 1968.

The intent of financial assistance to Baylor College of Medicine was to increase the estimated ratio of entering Texas resident medical students per 100,000 population. It was hoped that the 1968 ratio of 3.2 entering medical students from Texas per 100,000 population would be increased to a 6.2 ratio by 1980.

Expansion of first year classes at Baylor College of Medicine and at the three public medical schools, increased the ratio of entering students to 5.1 per 100,000 population in 1972. The addition of entering classes at two new public medical schools, The University of Texas Medical School at Houston and Texas Tech University School of Medicine in Lubbock, plus the private Texas College of Osteopathic Medicine in Fort Worth raised the total state ratio in 1972 to 6.7 per 100,000 population. By 1980, the ratio of total beginning students to population is estimated to reach between 8.4 and 9.0 to 100,000 population -- surpassing the Board's recommended ratio of 6.2 in the twelve-year period following.

RATIO OF ENTERING MEDICAL STUDENTS PER 100,000 POPULATION
IN TEXAS
1968 - 1980



3. There should be established a new, four-year public school of medicine in the Texas Medical Center in Houston. The new school should be designed for eventual enrollment of 200 entering students and should be operated as part of The University of Texas System. The new medical school should coordinate its activities with those of existing institutions in the area in order that the latter can provide required subsidiary educational offerings in such fields as engineering, the physical sciences, the humanities, and the social and behavioral sciences.

As recommended, The University of Texas Medical School at Houston had its first class of 32 in 1971. In 1970, 19 entering students were enrolled for the new Houston medical school in the UT Medical Branch at Galveston and the UT Southwestern Medical School in Dallas. These transferred to Houston in 1971 when the school first opened its doors. By 1974, the first-year students had been increased to 52. Projections indicate that the entering class enrollment will reach 100 by 1976.

The number of students at the Texas Medical Center in Houston increased from 2,600 in 1966 to 4,292 in 1972. Students were being trained and educated in at least 30 different areas at various levels within the health care professions.

4. Recent action by The University of Texas Board of Regents to coordinate the activities of university health education units in the Houston-Galveston area is commendable. The Coordinating Board suggests that there should also be established a vigorous Coordinating Council for area health education affairs. This council should involve The University of Texas, the Texas Medical Center in Houston, the Baylor University College of Medicine, the University of Houston, Rice University, the Harris County Medical Society and appropriate hospital authorities. The Coordinating Council for area health affairs should have no powers of control or coordination that impinge upon the powers and responsibilities presently allocated to the governing boards of the institutions and organizations involved.

This suggestion made by the Coordinating Board has not been implemented. However, the Texas Medical Center, Inc., provides overall planning coordination

and development for the Texas Medical Center as a whole. Policies are determined by the Texas Medical Center Board. That board is made up of 31 members, including four designated by position -- the Chairman of the Board of Baylor College of Medicine, the local Regent of The University of Texas, the President of the Harris County Hospital District and the President of the Harris County Medical Society. Other members are business and professional leaders in the community.

5. The production of physicians should be accepted as the primary role of our medical schools and medically related research and graduate work as secondary roles. Efforts to build in medical school campuses doctoral programs not obviously and directly associated with medical education, unless in the opinion of the Coordinating Board circumstances clearly dictate a departure, should be discouraged.

The recommendation stems from plans in the late sixties to introduce non-medically related programs into the curriculum of free-standing medical schools. Non-medically related programs are discouraged by the Coordinating Board. None has been approved. However, graduate programs supportive of medical education will continue to be essential to medical schools in order to provide teachers and researchers on a continuing basis.

While the 1968 Coordinating Board recommendations relegated medically related research to a secondary role, the intent was not to eliminate research but to keep it in proper perspective to the primary role of producing physicians.

Total state appropriations for research in all public health-related units increased from $3,605,000 in 1968 to $5,908,429 in 1972; of these, state-appropriated funds in 1972 comprised only 22.48 percent of all research funds, with the federal government contributing 63.65 percent.

6. The Coordinating Board recognizes the necessity for a medical school to serve the special needs of West Texans. The Coordinating Board therefore envisions an innovative medical school under the administrative control of Texas Technological College in Lubbock. Such a medical school could possibly be developed in partnership with the emerging medical center in Amarillo and with hospital authorities in Lubbock, Midland, and Odessa. The Board believes the institution could be designed for an annual complement of 100 entering students in the preclinical years on the Texas Technological College campus and that the four cities involved would provide clinical and post-graduate (internship and residency) levels of educational work for the new school. The Board recognizes that regional resources, both in academic programs at Texas Technological College and in clinical and post-graduate facilities in the cooperating communities, are not yet entirely adequate, but the Board, viewing the program in that area of Texas, believes these can be developed so the authorization from the Legislature can be requested in 1969 and the school be instituted as soon as facilities and programs are judged to be adequate by the Coordinating Board and financing is provided by the Legislature.

As the Coordinating Board's report recommends, the 61st Legislature, Regular Session, authorized the new medical school in 1969.

The new Texas Tech University School of Medicine began its innovative method of medical education with an entering class of 36 medical students in 1972, plus a junior class of 25. By 1980, an entering class of 100, as recommended by the Coordinating Board, is anticipated. The school produced its first graduating class of 24 students in March 1974. These students had entered as junior transfers.

7. Should the need for the establishment of another additional medical school develop in the future, that medical school, if authorized, could be an integral part of The University of Texas at Austin and could interweave its programs tightly with the University's comprehensive and nationally famed graduate curricula.

Legislative action in 1971 paved the way for implementation of this recommendation by authorizing the establishment of an additional medical branch of The University of Texas System, specifying that the location of the medical school be determined by the UT Board of Regents and approved by the Coordinating Board.

However, the Coordinating Board's Advisory Committee on Medical and Dental Education, at a meeting on February 17, 1973, unanimously passed the following motion:

> "The Advisory Committee on Medical Education wishes to convey to the Coordinating Board its feeling that at this time there is not a need for a new medical school in Texas."

8. Medical educators in all units should be encouraged to explore the possibilities for clinical and post-graduate educational capabilities available in Texas' distinguished medical centers such as those in El Paso, Temple, Tyler, and other cities. Where such opportunities exist, they should be maximally utilized for increasing the production of physicians and allied health personnel.

Clinical training is offered in medical centers, hospitals, and clinics throughout the state. All medical units, both public and private, participate in these training programs.

9. The Coordinating Board authorizes its staff to establish a permanent, formally-constituted advisory body to aid in continuous planning for dental and medical education and education in the health fields generally. Membership of this Committee should include representation from the Texas Medical Association, the Texas Dental Association, and other appropriate health professional organizations as well as from public and private colleges and universities involved in health education.

Although a permanent advisory body has not been constituted, the Board's Advisory Committee and Task Force on Medical and Dental Education were appointed in January 1973 and charged with a long-range study of medical and dental education in Texas.

10. The Coordinating Board hereby adopts as a policy the recurrent updating of all long-range medical education development plans for each involved institution or system component, and for the state as a whole. This updating process shall occur at intervals not longer than five years.

An updating of long-range medical education development plans for the State of Texas to satisfy this recommendation was begun early in 1973, not quite five years after the initial study referred to by the Coordinating Board.

Dental Education Recommendations

The seven recommendations concerning dental education and the present status of implementation are:

1. That a new state dental school be authorized, in accord with the following criteria:

   A. The new school should be constructed to enroll 150 first-year dental students.

   B. The new school should contain facilities for basic research, for post-graduate study in dental specializations, and for offering continuing education to the dental profession.

   C. Associated with a new school should be a department for training dental hygienists, designed to enroll 40 students annually; a department for training dental assistants, designed to enroll 50 students annually; and a department for training dental laboratory technicians, designed to enroll 40 students annually. These departments should offer guidance and leadership to community junior college programs in these ancillary fields.

   D. The new dental school should be located in and be a part of an established health service center with potential for future growth and expansion. The school should be near a university with a strong liberal arts college and graduate school.

   E. The new dental school should be affiliated with and adjoining a medical school, thus permitting multiple use of facilities, teaching and research laboratories, hospitals, and other facilities.

   F. The new dental school must have available an adequate number and variety of teaching cases. Hence it should be located in a metropolitan area.

   G. The new dental school should be under the administrative supervision of The University of Texas but should coordinate fully with nearby public and private colleges and universities, on a contract basis if necessary, to offer academic support in areas not directly associated with dental education.

2. That the location of the new dental school be at San Antonio for reasons set out below:

Ninety-four dental students are currently enrolled in The University of Texas Dental School at San Antonio. While permanent facilities are being constructed and scheduled for occupancy in September, 1975, the dental school program is being operated in other UT facilities connected with the Health Science Center at San Antonio.

The new facility will accommodate 152 first year students each year and the resulting second, third, and fourth year students. Also, the new school will have a department for training some 48 to 50 dental hygienists annually, a department for some 48 or 50 dental assistants, and a department for training a smaller number (as yet unspecified) of dental laboratory technicians.

No basic research, post-graduate study in dental specializations, nor continuing education for the dental profession currently is being offered, but such programs are planned for the future.

The dental school in San Antonio has access to the facilities and personnel of The University of Texas Health Science Center in San Antonio as well as the faculty and staff of the new University of Texas at San Antonio.

San Antonio, the third largest city in Texas, provides an adequate number and variety of teaching cases for the clinical aspects of the dental school curriculum.

3. The Coordinating Board recommends that the Baylor University College of Dentistry be encouraged to expand its entering classes by 50 resident students, and that provision for state support be negotiated along lines similar to those provisions for the public support of the expansion of enrollment in the Baylor University College of Medicine in Houston.

Since 1971 when Baylor College of Dentistry in Dallas was separated from Baylor University, the State of Texas has contracted with the college to provide dental education for Texas residents. In the fall of 1971, 105 first-year students were enrolled. First-year students had increased to 130 by the fall of 1972. A nine million dollar development program, if successful, will enable Baylor to enroll 150 first-year students, probably by 1977.

The State/Baylor contractual arrangement has increased the ratio of Texas resident to non-residents. For example, in 1971-72, the college enrolled 72 residents and 33 non-residents in the first-year class; in 1972-73, 108 residents and 22 non-residents were enrolled in the first year class.

4. State funded associate degree programs in appropriate dental ancillary fields should be promptly developed at several of the urban-based public junior colleges. Suggestions as to type, number and location of such programs should be made to the Coordinating Board by an advisory committee described in Recommendation #5 below.

Associate degree programs in dental ancillary fields are currently offered at Lamar University and the following community colleges: Del Mar, Bee County, Wharton, Tyler, Tarrant County, and Amarillo.

5. The Coordinating Board authorizes its staff to establish a permanent, formally-constituted advisory body to aid in continuous planning for dental and medical education and education in the health fields generally. Membership of this Committee shall include representation from the Texas Dental Association, the Texas Medical Association, and other appropriate health professional organizations, as well as from public and private colleges and universities involved in health education.

6. The Coordinating Board adopts as a policy the necessity of recurrent updating of all long-range dental education development plans for each involved institution or system component, and for the state as a whole. This updating process shall occur at intervals not longer than five years.

The Advisory Committee on Medical and Dental Education has completed its work to update long-range dental education plans for Texas.

7. If, for any reason, plans for the expansion of enrollments at the Baylor College of Dentistry in Dallas do not succeed, then a new dental school under The University of Texas System Board of Regents should be authorized and established in either Dallas or Houston.

Apparently, plans for expansion of enrollments at the Baylor College of Dentistry in Dallas are successful.

FROM THE FUTURE TO THE PRESENT:
A PLANNING APPROACH

FROM THE FUTURE TO THE PRESENT: A PLANNING APPROACH

Projection of requirements for medical and dental education in Texas for 1980 and beyond is replete with hazards. Manpower supply in the health professions, available or essential to assure a relatively healthy and productive population, is not the least among these. Funding of education for potential physicians, dentists, and ancillary personnel is complicated to estimate.

Changes in demand for services loom on the horizon. Third party payments for health care are on the increase. Unions and other organizations are experimenting with prepayment. A National Health Act, in one form or another, appears on the Congressional horizon. While population appears to be stabilizing, a change in direction is not beyond possibility.

The Advisory Committee and the Task Force on Medical and Dental Education in Texas, established by the Coordinating Board, Texas College and University System, in January 1973, found itself involved in these dilemmas as they related to planning toward 1980 and projecting toward the year 2000.

Time for meetings of these two planning bodies was at a premium. The state is large. Distances are great. Membership was distributed from far North to deep South and from far West to East Texas. Demands upon available hours are severe for practicing medical and dental professionals, for businessmen, industrialists, and members of the Advisory Committee from other professional groups. Presidents, deans, and other administrators and faculty members from public and private universities and colleges and from the medical and dental schools in these institutions were equally limited in available time.

Planning procedures for the future can very easily become bogged down in overriding problems of the present. This possibility loomed large at the first

meetings of both the Advisory Committee and the Task Force. Federal monies, which have flowed to educational institutions for health professionals, were slowing to a marked degree. Several questions of expansion of the number of existing educational facilities in colleges and universities were pressing for immediate consideration. How to take cognizance of these facts and yet move into consideration of future needs and priorities became a question for answer.

The Futures Planning Approach

Over the past decade several academic centers in the nation have been conducting research as well as application in experimentation to a study of Futures. Among the more noted of these are Syracuse University in the East and Stanford University in the West.[1] These, and several other institutions, have developed theory and methodology for application to a variety of scenarios of possible future courses for the nation.

More specifically, Warren L. Ziegler has applied these principles to Futures in a paper dealing with planning as action by institutions and organizations.[2]

A highly simplified approach borrowed from these sources offered possibilities for the Advisory Committee and the Task Force on Medical and Dental Education to the Coordinating Board.

At a joint meeting of these two bodies, the possibility of beginning with planning in the year 1980 was discussed. The customary approach would have

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[1]Educational Policy Research Center, Syracuse University Research Corporation, Syracuse, N.Y., and Educational Policy Research Center, Stanford Research Institute, Menlo Park, Cal.

[2]Warren L. Ziegler, "Planning as Action: Techniques of Inventive Planning Workshops," A Working Draft, Educational Policy Research Center, Syracuse University Research Corporation, 1206 Harrison Street, Syracuse, N.Y. 13210.

been from "where are we now" to "where are we going." But here lay likelihood of becoming so engrossed with the present that no vision for the future would emerge.

These advisory bodies were asked to begin their planning and their recommendations for what they considered best for medical and dental education in Texas in 1980. They were requested to keep the longer range of the year 2000 in the perspective of "Futures" as they talked and worked on what would be most effective in education in two of the major health professions in 1980.

By beginning with 1980 as they deemed it should be, the clutter of present dilemmas could be pushed aside temporarily. Of course, these would of necessity be taken into account. However, they would be laid aside for the moment as possible blocks of what ought to be considered for the future in medicine and dentistry.

No effort was made to develop alternative Futures, as the Task Force position papers and the tentative recommendations of the Advisory Committee subgroups will reveal. Instead, as these subcommittees of both the Advisory Committee and Task Force discussed and worked toward "feasible Futures" in medical and dental education, they consistently wrote, "if trends in the next six years remain the same."

That trends in the next six years may not remain the same leaves room for a major recommendation to the Coordinating Board.

- If a National Health Act is passed by Congress
- If there is a continuing and accelerating development of third party payment plans
- If there are developed rapidly more and more prepayment plans for medical and dental care by unions and other organizations

- If there is a reversal of population growth trends toward a rapid increase in birth and a decrease in death rates
- Then, a reactivation of the Advisory Committee and the Task Force on Medical and Dental Education should be put in motion by the Coordinating Board.

No attempt in this present effort has been made to offer solutions to problems in medical and dental education of this day. However, as recommendations for the future have taken precedence over the very real difficulties discernible in 1974, recommendations made for 1980 are firmly grounded upon the realities of 1974 as well as upon the less clear but desirable "Futures" of the next decade. A "Futures look" can offer clarity to setting a course forward, taking into account "present trends."

WORKING PAPERS

SUPPLY AND DISTRIBUTION OF PHYSICIAN AND DENTAL MANPOWER

STUDY SUBCOMMITTEES ON SUPPLY AND DISTRIBUTION
OF PHYSICIAN AND DENTAL MANPOWER

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SUPPLY AND DISTRIBUTION OF PHYSICIAN AND DENTAL MANPOWER

Numbers of medical and dental students required to reach or to maintain an adequate supply of physicians and dentists in Texas depend on several factors. These include manpower supply already available, students now being educated, numbers of physicians and dentists migrating in and out of the state, retiring, or leaving practice for other reasons. Assumptions must be made also concerning appropriate physician- or dentist-to-population ratios. These are based on past experience and on theoretical goals set nationally or statewide by various health groups and professional associations.

Geographical distribution, distribution by specialty, and numbers of trained paraprofessional personnel must also be taken into account in a discussion of health manpower.

Physician Manpower

To predict the supply of physicians, a number of assumptions have been made:

- Physicians become productive in health care one year after graduation, upon completion of the internship or year one of the residency, at an average age of 27.
- Most physicians will work for 28 to 30 years.
- Early deaths, retirements, and other departures from practice will be balanced by those who practice for a longer period.
- The number of physicians entering the work force each year should be 3.5 percent of the practicing work force to assure a steady supply of physicians.
- The 1980 population projection for Texas is 13,230,179.[1] This number may be high, given present-day trends and attitudes.

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[1]Projection as of July 1974 made by Population Research Center, The University of Texas at Austin.

- Recommendation of the American Medical Association of 180 federal and non-federal physicians per 100,000 population (one physician to 556 population) may be accepted as valid.

Texas should have 23,760 physicians (180 x 132) by 1980 on the basis of these assumptions. The number of new physicians entering the work force each year, therefore, would be 831 (3.5 percent of 23,760).

Not all physicians graduating from medical school will enter practice. About four percent of those who enter medical school do not earn the M.D. degree. Approximately five percent of physicians have no contact with patient care. Approximately another five percent of physicians have limited contact with patient care.

Therefore, in terms of entering students, to harvest 831 physicians actively engaged in full patient care, almost 950 students--831 + 116 (14 percent of 831)--must enter medical school each year.

If a physician's productive practice is assumed to continue for only 25 years, almost as many men and women would have to enter practice each year as are needed to enter medical school each year to replace physicians practicing 28 to 30 years. If 25 years of productive practice are assumed, four percent of the desirable steady state goal would need to be replaced each year. On this basis, 950 new physicians would have to enter practice each year, and 1,083 would have to enter medical school to attain that figure.

Out-migration of Texas graduates and in-migration of non-Texas graduates also must be considered. Data are not available on out-migration, but a widely accepted constant among medical schools is that one-third migrate. Texas almost certainly retains more of its graduates than this figure indicates, based on national averages. Available data show that of physicians who are now in Texas, graduating from any medical school between 1955 and 1965,

55 percent were born in Texas, 65 percent went to medical school in Texas, and 70 percent took their graduate training in Texas. These figures tend to support an in-migration of about 33 percent, balancing or more than balancing out-migration.

Other data indicate this percentage is conservative. Florida, California, and Texas have consistent records of attracting large numbers of graduates from other schools. Data for the past six years show that of 6,559 newly licensed physicians, 2,000 or 30.5 percent were graduates of Texas schools.

TABLE 1

PHYSICIANS LICENSED TO PRACTICE IN TEXAS

Year	M.D.'s Texas Schools	M.D.'s Out-of-State Med. Schools*	D.O.'s	Foreign M.D.'s	Total
1968	316	350	47	148	861
1969	289	489	47	158	983
1970	341	452	55	167	1,015
1971	311	516	43	215	1,085
1972	302	612	45	207	1,166
1973	441	685	41	282	1,449
TOTALS	2,000	3,104	278	1,177	6,559

*These figures include graduates of out-of-state medical schools who obtain Texas licerse either by examination or reciprocity.

SOURCE: Texas State Board of Medical Examiners.

Texas medical schools graduated 2,274 students in these same years. Thus, 87.95 percent of the number graduating from Texas schools at the present time are licensed to practice in Texas. Although the two populations are not entirely synonymous, the data indicate that Texas has held its graduates well in recent years.

TABLE 2

PHYSICIANS GRADUATED FROM TEXAS MEDICAL AND OSTEOPATHIC SCHOOLS 1968-1973

School	1968	1969	1970	1971	1972	1973	Total
BAYLOR	85	85	88	89	83*	111	541
TEXAS TECH	0	0	0	0	0	0	0
UNIVERSITY OF TEXAS							
DALLAS	97	96	107	109	102	114	625
GALVESTON	139	138	148	133	150	165	873
HOUSTON	0	0	0	0	0	0	0
SAN ANTONIO	0	0	33	30	71	101	235
TEXAS COLLEGE OF OSTEOPATHIC MEDICINE	0	0	0	0	0	0	0
TOTALS	321	319	376	361	406	491	2,274

*Plus one awarded posthumously.

SOURCE: Staff of Coordinating Board, Texas College and University System.

Of the 6,559 newly licensed physicians in the past six years, 3,104 (47.3 percent) were graduates of out-of-state medical schools. Schools of osteopathic medicine graduated 278 (4.2 percent). The remainder of 1,177 (17.9 percent) were graduates of foreign schools.

To express these data another way, an average of 1,093 physicians have been newly licensed in Texas per year for the past six years. An annual average of 333 of these were graduates of Texas schools, and 760 came from out of state.

Texas as a vigorous importer of physician manpower is a conclusion which must be drawn from these data.

A smooth growth rate of 3.2 percent per year has been averaged for five years, 1968-1972, for the total of non-federal physicians in Texas.

TABLE 3

NON-FEDERAL PHYSICIANS IN TEXAS IN 1968-1973

Year	Total* Physicians	Patient Care			Other Professional Activity***
		Total	Office Based Practice	Hospital Based Practice**	
1968	12,144	10,545	8,694	1,851	918
1969	12,566	11,018	9,006	2,012	850
1970	12,977	11,380	9,287	2,093	891
1971	13,462	11,818	9,603	2,215	851
1972	14,192	12,258	9,871	2,387	829

*Non-classified or inactive physicians for each year are not shown in other categories.

**Category includes interns, residents, and full-time physician staff.

***Other Professional Activity includes medical teaching, administration, research, and other.

SOURCE: Distribution of Physicians in the U.S. (Chicago: Center for Health Services Research and Development, American Medical Association, 1969, 1970, 1971, 1972, 1973).

In summary, incomplete date are available on the rate at which physicians are migrating from Texas. Medical schools in Texas have graduated an average of 379 students per year for the past six years, of whom 333 have taken their initial licenses in Texas. An average of 1,093 new licenses have been issued annually. A new increment of 400 actively practicing physicians has been realized per year. Thus, the sum of losses due to death, retirement, and emigration is approximately 600 per year.

A projection of 985 graduates per year from Texas medical schools is expected.

TABLE 4

PROJECTIONS OF PHYSICIANS GRADUATING FROM TEXAS MEDICAL AND OSTEOPATHIC SCHOOLS 1976-1980

School	1976	1978	1980
BAYLOR	168	168	168
TEXAS A&M-BAYLOR	---	---	32
TEXAS COLLEGE OF OSTEOPATHIC MEDICINE	48	60	60
TEXAS TECH	38	40	100
UNIVERSITY OF TEXAS			
DALLAS	132	200	200
GALVESTON	200	205	203
HOUSTON	48	52	100
SAN ANTONIO	112	122	122
TOTALS	746	847	985

SOURCE: Staff of Coordinating Board, Texas College and University System, based on projected figures from each school.

The total new physicians entering practice each year in Texas by 1980 can be projected as follows:

Assume 87.9 percent of Texas graduates will take initial licenses in Texas	= 866
Assume same number continue to immigrate	= 760
TOTAL new physicians per year (by 1980)	1,626
1980 population 13,230,179 x 180 per 100,000	
Desirable federal and non-federal physician population	= 23,760
3.5 percent new physicians for conservative steady rate:	
New physicians needed per year - 77	= 831

Distribution by Specialty

Not enough generalists in relation to specialists are in medical practice in Texas at the present time. Although the numbers of physicians in primary care for the past ten years have increased, the percentage has steadily decreased.

TABLE 5

TEXAS TRENDS IN PRIMARY CARE 1963-1972

Year	Total M.D.'s In Patient Care	Primary Care M.D.'s*					Primary Care Percentage
		GP	IM	Ped	Ob/Gyn	Total	
1963	8,517	3,364	848	454	556	5,222	61.3
1964	8,761	3,329	894	475	573	5,271	60.2
1965	8,918	3,295	914	486	595	5,290	59.3
1966	9,080	3,256	923	495	614	5,288	58.2
1967**	9,272	3,226	967	506	637	5,336	57.5
1968	9,139	2,887	876	487	639	4,889	53.5
1969	9,467	2,827	891	496	671	4,885	51.6
1970	9,789	2,829	944	515	716	5,004	51.1
1971	10,105	2,808	1,012	534	734	5,086	50.3
1972	10,383	2,788	1,057	558	756	5,159	49.7

*Excludes interns and residents.

**Because of change in classification systems, the figures from 1963 to 1967 are not strictly compatible with the figures from 1968 on.

SOURCE: Distribution of Physicians in the U.S. (Chicago: Center for Health Services Research and Development, American Medical Association, 1964-1973).

Specialty practice is entered through graduate or residency training in that specialty. The most practical way to influence directly the numbers of specialists at the state level is to influence graduate training opportunities. Expanding those related to primary care is required. Curtailing or expanding to a lesser degree other specialties appears desirable.

Policy formulation in this arena of higher education has been placed in the lap of such groups as the Coordinating Board. A number of forces have combined to bring this about:

1) The concept is emerging that the university, not the hospital, should be the organization through which graduate medical education is coordinated.

2) Pressures from the Cost of Living Council on hospitals are forcing them to curtail costs. In the face of an inability to pass along costs to consumers, hospitals are eyeing critically tasks that are non-essential to corporate survival. They are searching for those which are potentially transferable to other agencies, such as education. Hospitals are increasingly anxious to get out of the business of education.

3) The stand taken by Social Security is a bellwether for all third-party payers. Education is not considered a legitimate cost to be borne by them. This struggle is on-going and its outcome is uncertain, except that a different equilibrium will be reached.

4) A constantly decreasing population is available to be "practiced on" by trainees because of changing social attitudes. Furthermore, as charity hospitals decrease in number and size, trainees are increasingly less necessary to do the work of these hospitals. Trainees as a source of cheap medical labor to attend the poor are being increasingly recognized as a serious distortion in training practices.

5) Salaries of the trainees and the costs attached to their presence have increased greatly. An intern at $50 a month and a resident at $75 are very different propositions from the same employees at $1,000 a month.

For these reasons, the current post-M.D. medical training system is ripe for change. New sources of funding are certain to be sought. Location of graduate training is recognized as the most important determinant of where a physician settles. A state policy with expanded training opportunities in fields of primary care would exercise some leverage on distribution by specialties. This could be accomplished by such a mechanism as:

- State support to medical schools to assist in providing primary care education to undergraduate medical students and to resident physicians in hospitals and other clinical facilities more widely distributed throughout the state.

Geographical Distribution of Physicians

The Coordinating Board has very little direct leverage in influencing physicians to settle in rural areas and urban ghettos except by influencing the ratio of primary physicians to specialty physicians. However, it is obvious that if all western countries (i.e., Sweden, England, France, as well as the United States) have difficulty in settling doctors in such practice situations, some action needs to be taken to increase health care delivery in these areas.

Educational Investment

Physicians and the non-expert lay public, when considering the provision of health care, initially and automatically think in terms of physicians, the most highly differentiated level of health care.

Such health care is expensive. A physician generates the need for a large cash flow. This includes not only his income and his income tax, but also expenditures for a nurse, secretary, drugs, bandages, laboratory tests, maintenance of an office, hospitalization, and X-rays. A rule of thumb for a physician's income is one-third for his office, one-third for taxes, and one-third for the physician. If a physician takes home $50,000 a year and hospitalizes 150 patients for 6.6 days each at $100 a day (or three patients a week), a total cash flow of $250,000 is generated.

The level of health care in an economically depressed area, no matter what the level of education of the deliverer, will be determined by what can be supported by local finances, or by local and external subsidy.

The physicians' behavior or function will fall toward the less sophisticated if such support is marginal. If health care is provided by less differentiated personnel (public health nurse, pharmacist, mid-wife, or auxiliary health personnel), their behavior will tend to differentiate. These personnel will begin carrying out a variety of tasks more complex than they usually undertake, under such circumstances.

What really differentiates the physician from the other health professionals? One difference is the license of the physician. Another is his unusual powers and privileges. Another differential point from an economic point of view is the level of investment necessary to produce a physician. This figure can be estimated from $1,500 (tuition in Texas schools) to $250,000. A realistic figure is probably from $150,000 to $200,000.

Conversely, other, less differentiated, health care workers require a much lower initial investment.

Summary and Recommendations

Data indicate that the educational opportunity for producing the most highly differentiated health care personnel is at present adequate or more than adequate.

Texas has, or will have, enough physician manpower for the needs of the decade ahead, provided the experience of the past six years continues to apply. This assumes completion of planned expansion of The University of Texas Medical School at San Antonio, Texas Tech University School of Medicine, and The University of Texas Medical School at Houston. It also assumes implementation of the Texas A&M/Baylor College of Medicine program in affiliation with the Veterans Administration and continued development of Texas College of Osteopathic Medicine.

No further steps need to be taken to increase enrollments beyond current projections and capacities.

Texas will continue to attract graduates of out-of-state American schools in excess of Texas graduates who leave the state. No active measures need to be taken to either encourage or discourage this trend.

Texas should take an active role in the formulation of national policies dealing with the increasing rates of immigration of foreign graduates of foreign medical schools. Opinion is growing that this influx should be curtailed.

To solve the remaining problems in adequate health care delivery for Texas, three recommendations are made:

- Pressures should be exerted to encourage post-M.D. training in primary care specialties and to discourage post-M.D. training in other specialties.

- Training less differentiated health care workers prepared to work in a supervised, hierarchical health care system in appropriate numbers should be increased.
- The education of physicians and other health professionals to work as teams should be planned.

Dental Manpower

Planning for the needs for dentist-manpower is based upon somewhat different criteria from those that determine the need for physicians. Dental health needs are more predictable than are medical care needs. Consequently, dental health needs are more amenable to planning and scheduling.

Delays in reaching a dentist only infrequently generate the same degree of personal and public concern as do obstacles to finding an available physician. Although many persons, including a majority of those in low income families, still do not receive adequate dental care, such failure results more frequently from apathy, ignorance, and financial barriers than from an actual unavailability of dental services.

The dental profession, since 1935, has sought to devise methods for extending care to a higher percentage of the population. This illustrates a continuing attempt by the profession to satisfy the changing interests and demands of the public. The provision of dental care to more people obviously must be a function of available dentists and their assistants.

Predictions are hazardous where rapidly changing human factors are under consideration. Interpretation of this information must be tempered with constraints imposed by the probability of error and by the frailties of assumptions that are made.

Adequacy of Present Dentist-Manpower

The bases from which to determine dentist-manpower supply and needs and upon which to make projections must include consideration of needs and accessibility, utilization, dentist manpower, and distribution of dentists.

A wide disparity exists between the need for dental care and demands for care in the United States. While the need is virtually universal, not all who need care seek it. Of those who seek care, not all can get it, for one or more reasons.

Barriers to accessibility of care include:

1) The high cost of care
2) Shortage of dental manpower
3) The absence of dentist-manpower in some geographical areas
4) The gap between what the dental profession should potentially produce and what it is producing

Demands for and utilization of dental care, however, are increasing. A number of factors are responsible for this increase:

1) Population growth and population shift
2) Rising income levels
3) Improved educational levels
4) Growth of prepayment and third-party payment programs
5) The impact of federal legislation

Within the past decade, the percentage of the population which visits a dentist annually has risen from 40 to 43 percent. This statistic is deceiving, because it is estimated that only half of those people visiting a dentist in a year seek comprehensive care on a regular periodic basis, while the other half visiting a dentist each year go for treatment of acute problems.

In the period from 1960 to 1970, consumer expenditures for dental care in the United States have more than doubled, from $2 billion to $4.3 billion. The significance of this increase is reduced by a concomitant increase in dental fees of almost 50 percent, from a price index of 104 in 1960 to 152 in 1970. The remaining 50 percent increase in expenditures for dentistry reflects increased utilization and demands.

A 10 percent increase in utilization of dental care is anticipated over the next decade.

Dentist-Manpower Trends

While demands for dental care and utilization are increasing, the supply of dentists per unit of population has been decreasing.

The dentist to population ratio in the United States in 1935 was approximately 1:1,730; in 1970 it was approximately 1:2,100.

In 1970 there were 4,700 non-federal dentists in Texas. Of these, 4,216 were active.[2] The civilian population in Texas that year was 11,196,730. Thus, there were 37 active non-federal dentists per 100,000 civilian population, as compared with the national figure of 47 per 100,000 population. The Texas figure, however, represents an increase from 33 active non-federal dentists per 100,000 population in 1967. The 1970 Texas dentist to population ratio was approximately 1:2,700.

The median age of non-federal dentists in the United States is 48. The median age varies geographically by plus or minus five years. The median age of non-federal dentists is about 43 in the West and South and rises to 53 in the Northeast.

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[2]An active dentist is identified here as one engaged in practice who is under age 68.

The average dentist spends approximately 1,600 hours per year in productive chairside service. On the basis of the national ratio of 1:2,100, if all the people in the United States visited a dentist during any one year and if the population were evenly distributed throughout the country, only 45 minutes per person would be available for treatment. Applying the same premises to Texas, with one dentist to almost 2,700 people, only 35 minutes would be available for treatment for each person. To understand the possible implication of these generalizations, however, the 46 percent utilization factor, as well as the 23 percent comprehensive-care-utilization factor explained above, must be applied.

Determinants of manpower adequacy and need include certain independent variables which are unpredictable. Factors leading to a decreased manpower need would be:

1) The extent to which preventive dental programs are applied in private practice and community programs
2) The acceptance of fluoridation
3) Technologic improvements in dental care delivery
4) Continuing education for dentists to improve their effectiveness
5) Utilization of and increased duties for dental auxiliaries
6) Progress in research, and its application
7) Changes in the national economy, such as a recession

Factors which could lead to an increased manpower need might include:

1) A sharp rise in utilization
2) An increase in number and scope of labor and industry types of sponsored prepayment plans
3) An increase in third-party payment programs, including a possible national health care program
4) A sharp increase in population

Finally, factors to be considered which affect local manpower adequacy are the distribution and migration of dentists, and population shifts and migrations.

Distribution of Dentists

The distribution of dentists by state varied widely in 1970. For the country as a whole, there were 47 active non-federal dentists per 100,000 civilians (1 per 2,100 population). However, the ratio varied from 68 per 100,000 (1:1,500) in New York State to 26 per 100,000 (1:3,800) in Mississippi, compared with the Texas ratio of 37 active non-federal dentists for each 100,000 civilians, or 1 per 2,700.

The distribution of dentists within any state also varies widely. Dentists establish practices where they can make a living and where cultural benefits and social amenities are available. It has been estimated that approximately $4 million in public buying power is required to support the need for one dentist.

For 1972, the dentist to population ratio varied throughout Texas from a high of 1:1,848 in Dallas County to a low of 1:18,100 in Maverick County, not including the 35 counties in Texas which lack an active dental practitioner. Texas dentists tend to settle in the urban centers, leaving many rural communities and counties painfully short of dental care delivery. The largest county without a dentist is Starr with a population of 17,700; the smallest, Loving, with a population of only 200. The ten largest cities in Texas include 53 percent of the state's total population and 61 percent of the state's active non-federal dentists. Thus, only 1,644 dentists are available to serve the more than 5 million civilians in the rest of the state.

Trends in Population and Manpower Changes

The identification of trends is important before any projections can be made. An analysis of changes that have occurred in the past will yield certain

factors and constants that may be applied to current statistics for estimating what will prevail in the future.

The population in the United States has been increasing at a fairly uniform rate. Except for sporadic spurts in the pattern of growth, the population increases at the rate of approximately 1 1/4 percent per year. The Texas population, however, has been increasing at a higher rate.

In the 10-year period from 1960 to 1970, the population in the United States rose by 13 percent, while in Texas, over the same decade, the increase was 16 percent.

TABLE 6

POPULATION AND DENTISTS IN THE UNITED STATES 1950-1970

	Number of Dentists			Civilian Population (in thousands)	Active Non-Federal Dentists Per 100,000 civilians
	Total	Active*	Active Non-Fed.		
1950	87,164	77,900	75,513	150,790	50
1960	101,947	89,215	82,630	178,136	46
1970	118,120	103,400	95,422	201,717	47

*Under age 68.

Not all dentists are actively engaged in providing care to the civilian population. Approximately 12.5 percent of the dentists in the United States are inactive in the profession because of such circumstances as retirement, or engaging in other activities.

Approximately 6.5 percent of the total dentists in the United States are federally employed, either in the armed forces, the Public Health Service or the Veterans Administration.

Although most dentists are general practitioners, serving people of all ages, the trend toward specialization is increasing. In 1960, there were 4,170 dental specialists in the United States, 4.7 percent of the total

active dentists. In 1970, the number of specialists had increased to 10,315, or 9.1 percent of the total active dentists. These numbers include dental specialists in the federal dental programs. Of those engaged in the practice of a specialty in 1970, 5,494 were orthodontists and pedodontists, serving children almost exclusively.

In 1970, there were 380 dental specialists in Texas, or 3.4 per 100,000 Texas civilians (1:29,465).

The absence of reciprocal licensure in dentistry among the states has discouraged dentist-migrations from state to state. This factor, nevertheless, cannot be ignored. Unfortunately, there are no data on the number of out-of-state dentists who take the examination of the Texas State Board of Dental Examiners and remain in Texas each year to practice. Nor are data available on the number of Texas graduates who leave Texas each year to practice in another state.

Federal support of professional education and the availability of other incentives have stimulated an increase in the number of dental schools in the United States and the expansion of existing schools. In the decade from 1963 to 1973, the number of dental schools rose from 47 to 58. During the same period, the number of first year places increased from 3,700 to 5,500 and the number of graduates from 3,200 to 4,900.

Before September 1970, Texas had two dental schools. A third was activated in 1970. The total dental student enrollment in Texas in 1969-70 was 784, rising to 800 in 1970-71, and to 1,037 in 1973-74. A total of 192 dentists were graduated in Texas in 1970; approximately 231 will be graduated from the three Texas schools in 1975. Further expansion of the three Texas schools is expected to level off at 401 graduating dentists per year by 1980.

TABLE 7

SCHOOLS, DENTAL STUDENTS, AND GRADUATES
BY SELECTED YEARS IN THE UNITED STATES AND TEXAS

	No. of Schools		Enrollment		1st Year Places		No. of Graduates	
	U.S.	Texas	U.S.	Texas	U.S.	Texas	U.S.	Texas
1969-70	53	2	16,008	784	4,355	200	3,749	192
1970-71	53	3	16,553	800	4,565	221	3,793	189
1973-74	58	3	19,870*	1,037	5,500*	286	4,950*	304**

*Approximations

**This figure includes estimated graduates in both January and September, the phase-in period of the three-year curriculum at Baylor College of Dentistry. In subsequent years, there will be only one graduating class per year, as in previous years.

TABLE 8

PROJECTED DENTAL SCHOOL ENROLLMENT AND GRADUATES
IN TEXAS 1974-1980

	Number of Schools	Enrollment	Graduates
1974-75	3	1,110	231
1977-78	3	1,506	269
1979-80	3	1,624	401

Data on deaths of dentists are based upon estimates. It is estimated that 12,300 dentists will die in the five-year period ending in 1975; 12,400 will die in the five-year period ending in 1980. While it may be assumed that most deaths will occur among those who are retired, specific data are not readily available. Deaths, therefore, must be related to the total number of dentists. Thus, between 9 and 10 percent of all dentists die each five years, or approximately 2 percent per year.

Assumptions

Estimates of dentist-manpower adequacy and projections are dependent upon the assumption that the trends identified over the immediate past will prevail over the short-range future.

Such assumptions include:

1) Population growth will continue at a fairly constant rate of approximately 1.5 percent per year.
2) Utilization of dental services will increase by 10 percent over the next decade.
3) Distribution patterns of dentists will remain fairly constant.
4) Military needs for dentists will remain constant, utilizing approximately 6.5 percent of all dentist-graduates.
5) Continued retirement from active practice will remain fairly constant.
6) Technological improvements will increase dentist productivity to offset increasing demands of the public and the loss of two percent of the dentist force due to deaths.
7) The percentage of dentist-graduates seeking specialty training each year will increase to approximately 15 percent of the total.
8) The number of dentists graduating from the three Texas dental schools will gradually increase, levelling off at 401 per year, as shown in Table 8.
9) The number of dentists who leave Texas to practice in another state will be offset by a like number who migrate to Texas from out-of-state to practice. No data are available on the percentage of out-of-state dentists who take the Texas Board each year and remain to practice.
10) Increased utilization will be accommodated by increased productivity.

Use of any yardstick in projecting manpower adequacy and needs cannot predict potential changes in the economy, utilization, demand, or in the growth of third-party payment and prepaid dental care programs. Therefore, estimates are based upon maintenance of the status quo.

TABLE 9

PROJECTIONS FOR DENTIST-MANPOWER IN TEXAS
1970-1980

Year	Dentists	+	Graduates	-	Specialty Training (10-15%)	-	Military (6.5%)	Total Active Non-Fed
1970	4,088	+	192	-	19	-	12	4,249
1971	4,249	+	189	-	19	-	12	4,407
1972	4,407	+	188	-	19	-	12	4,564
1973	4,564	+	186	-	19	-	12	4,719
1974	4,719	+	304*	-	30	-	20	4,973
1975	4,973	+	231	-	35	-	15	5,154
1976	5,154	+	269	-	40	-	17	5,366
1977	5,366	+	269	-	40	-	17	5,578
1978	5,578	+	269	-	40	-	17	5,790
1979	5,790	+	269	-	40	-	17	6,002
1980	6,002	+	401	-	60	-	26	6,317

*Includes two graduating classes from Baylor College of Dentistry during phase-in period of the three-year curriculum.

Goals for Establishing Needs and Adequacy

A definition of the ideal proportion of active dentists to the civilian population is fundamental to a consideration of goals to establish needs.

The armed forces set their dentist needs at one for every 500 servicemen. Much potential manpower in the military, however, is used in administrative and command positions. The American Psychiatric Association has

TABLE 10

PROJECTIONS FOR DENTIST-TO-POPULATION RATIOS IN TEXAS 1970-1980*

Year	Population	Active Non-Federal Dentists**	Dentist to Population Ratio
1970	11,196,730	4,249	1:2,635
1971	11,428,000	4,407	1:2,593
1972	11,604,000	4,564	1:2,543
1973	11,794,000	4,719	1:2,499
1974	11,970,910	4,973	1:2,407
1975	12,002,000	5,154	1:2,329
1976	12,182,000	5,366	1:2,270
1977	12,364,730	5,578	1:2,217
1978	12,550,200	5,790	1:2,168
1979	12,738,453	6,002	1:2,122
1980	12,929,530	6,317	1.2,047

*1970 Population on Figure - U.S. Bureau of Census; 1971, 1972, 1973, 1975 - Projections from Population Research Center, The University of Texas at Austin. Other projections figured at a rate of increase of 1.5 percent per year.

**See Table 4.

established a standard of one dentist for every 1,000 patients in a mental health facility. But the nature of the patient in such institutions places increased demands in terms of time and effort required per case. The Division of Physician and Health Manpower Education, the Department of Health, Education, and Welfare, has identified areas in need of additional dentists as those with a dentist-to-population ratio below 1:3,000. These criteria are not applicable to establishing an ideal ratio of dentist-to-population in Texas.

A more suitable goal for Texas over the next ten years can be identified as an increase in dentist-manpower to approach the current national level of at least 47 active non-federal dentists per 100,000 civilians, or 1 per 2,100 population.

Summary and Recommendations

The estimated increase in the number of dentists who will graduate from Texas schools will improve the number of dentists available per unit of civilian population in Texas. Such improvement will surpass by 1980 the national availability of dentists which prevailed in 1970.

This estimate is based upon the assumptions stated above, coupled with anticipated increased productivity through improved technology, more effective utilization of dental auxiliaries and better dental health care delivery, and expanded preventive efforts. This number is predicted to be adequate to meet increasing demands for dental care from a growing and more affluent civilian population.

A more equitable distribution of dental manpower in Texas, nevertheless, is necessary. Recommendations to relieve maldistribution of dentists in Texas are:

- A system of preceptorships and internships in underserved areas in Texas should be developed by the dental schools in cooperation with professional associations.
- A better exchange of information should be effected between graduates of dental schools and underserved areas of the state through development of a central clearinghouse and practice location service with cooperation of the three dental schools and the professional associations.

- Dental schools should recruit more dental students from rural areas and from minority ethnic groups in Texas.
- Provisions of scholarships, with loan forgiveness and other incentives, should be provided by the State of Texas to encourage dental practice in underserved areas.

MEDICAL AND DENTAL SCHOOL ADMISSIONS

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SCHOOL ADMISSIONS

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MEDICAL AND DENTAL SCHOOL ADMISSIONS

Medical School Admissions[1]

Nationwide, more than three students applied in 1974 for each existing place in medical school entering classes. In Texas, the competition is even greater.

Texas medical schools enrolled a total of 847 students in 1974 entering classes. The great majority of the enrolled students are Texas residents. At each school they were selected from a large pool of highly qualified applicants. The new Texas Tech University School of Medicine enrolled 43 first-year students, selected from 1,643 applicants; the four University of Texas System schools enrolled 573 out of 2,709 applicants; Baylor College of Medicine enrolled 168 out of 4,028; and the Texas College of Osteopathic Medicine enrolled 60 out of 457.

Publicly supported medical schools all over the country, including those in Texas, discourage enrollment of nonresident students. In spite of this policy, 845 nonresidents applied to The University of Texas System schools, and 539 applied to Texas Tech. Because of the stiff competition among applicants for entering class places, most applicants apply to a number of schools. The magnitude of multiple applications is indicated by the almost 3,000 nonresident students who applied to the private Baylor College of Medicine and may be assumed to have applied also in their own states. More than half (232) of Texas College of Osteopathic Medicine's applicants were nonresidents.

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[1]The information on medical schools is adapted from "Medical School Admission: A Special Report," by Gene Powell, Director of The Office of Student Personnel Services, The University of Texas Medical Branch at Galveston, which appeared in Vol 5, No. 2 (November, 1973) of University Medical, published by the UT Medical Branch.

Medical schools, in general, have reduced the number of science courses required for admission. These courses constitute less than 40 percent of the semester hours for the baccalaureate degree. Premedical students may choose among a wide range of degree programs. It is prudent for students to plan a degree program which will prepare for alternative vocations. Less than 40 percent of the applicants to United States medical schools can expect to be enrolled. Individual achievement rather than the degree program is most important in gaining admission to medical schools.

Medical schools are seeking students who perform consistently well in all areas of study.

Admissions Procedures

Four areas receive major consideration in the selection process. These are:

(1) Academic performance as measured by grade point average

(2) Medical College Admission Test scores

(3) Evaluation of the applicant by his premedical committee

(4) Personal interview

Committees on admissions do not interview all applicants. The philosophy of the committees is that an applicant ordinarily will not be interviewed unless his or her academic record, Medical College Admission Tests scores, and premedical evaluation are sufficiently competitive. Each applicant is carefully screened before an invitation for an interview is made. If the credentials are such that he or she is clearly not competitive, an invitation for an interview is not given. Teaching, research, and patient-care demands upon the individual members of committees on admissions are such that interviews are impossible to offer all applicants.

In selecting an applicant for an interview or for admission, consideration is also given to criteria such as the relative strengths of schools and degree programs; science versus nonscience performance; motivation, personality, and maturation; year-by-year academic profile; extracurricular activities and special training or skills. However, there is little justification in interviewing applicants whose academic credentials and/or Medical College Admission Test scores are well below the competitive level, as determined by the applicant pool rather than by an arbitrary standard, regardless of their other qualifications. Noncognitive criteria are important, but they are important along with, and not independent of, academic performance and test scores.

Medical schools are interested in more than grades and test scores. However, the quality and quantity of applicants is such that all existing positions can be filled with students of high academic achievement who are also well-rounded, highly motivated, personable, socially aware, and humanistically oriented.

A review of the credentials of applicants for admission to the 1974 entering classes of Baylor College of Medicine and The University of Texas System medical schools illustrates the magnitude of the problem in selecting students. (See Tables 11, 12, 13, and 14)

The grade point average is calculated by A=4.0; B=3.0; C=2.0; D=1.0. Note that 2,830 applicants to Baylor College of Medicine and 1,942 applicants to The University of Texas System medical schools achieved a grade point average higher than a "B" (3.0). Thus, it was mathematically possible to fill every position in every medical school in Texas without going below the "B" level and still have more than 1,000 applicants with "B" averages who failed to gain admission in Texas. The student who fails to achieve at least a "B"

average has little chance of gaining admission even if other credentials are superlative.

TABLE 11

GRADE POINT DISTRIBUTION OF 1974 APPLICANT POOL
BAYLOR COLLEGE OF MEDICINE

Grade Point Range	Number	Percentage
4.00-3.76	459	11.40
3.75-3.60	411	10.20
3.59-3.51	261	6.48
3.50-3.41	344	8.54
3.40-3.31	375	9.31
3.30-3.16	545	13.53
3.15-3.01	435	10.80
3.00-2.76	506	12.56
2.75-2.60	236	5.86
2.59 & Under	424	10.53
None	32	0.79

TABLE 12

GRADE POINT DISTRIBUTION OF 1974 APPLICANT POOL
THE UNIVERSITY OF TEXAS SYSTEM'S MEDICAL SCHOOLS

Grade Point Range	Number	Percentage
4.00-3.76	309	11.41
3.75-3.60	245	9.04
3.59-3.51	190	7.01
3.50-3.41	252	9.30
3.40-3.31	258	9.52
3.30-3.16	393	14.51
3.15-3.01	295	10.89
3.00 & Under	767	28.31

Of 1,643 applicants to Texas Tech University School of Medicine, 43 were accepted for the 1974 entering class. Average grade point average for the enrollees was 3.21.

TABLE 13

MEDICAL COLLEGE ADMISSION TEST DISTRIBUTION OF 1974 APPLICANT POOL
BAYLOR COLLEGE OF MEDICINE

Range	Number	Percentage
651 & Over	281	6.98
601-650	896	22.24
576-600	591	14.67
551-575	505	12.54
526-550	445	11.05
501-525	365	9.06
451-500	453	11.25
450 & Under	461	11.44
Unknown	31	0.77

TABLE 14

MEDICAL COLLEGE ADMISSION TEST DISTRIBUTION OF 1974 APPLICANT POOL
THE UNIVERSITY OF TEXAS SYSTEM'S MEDICAL SCHOOLS

Range	Number	Percentage
651 & Over	116	4.28
601-650	449	16.57
576-600	380	14.03
551-575	390	14.40
526-550	382	14.10
501-525	313	11.55
451-500	407	15.02
450 & Under	229	8.45
Unknown	43	1.59

Average MCAT scores for students enrolled in the 1974 entering classes of Texas schools were 611 at Baylor College of Medicine; 578 at The University of Texas System medical schools; and 533 at Texas Tech University School of Medicine.

The Medical College Admission Test is composed of four subtests. These measure verbal and quantitative aptitude, the breadth of range of general knowledge in the arts, humanities, and social studies, and the applicant's grasp of fundamental principles of science. Test results are reported in terms of percentile scores ranging from 0 to 99 and also in terms of scaled scores ranging from 205 to 795. The percentile scores are based upon the performance of the combined group of applicants tested in May and October of 1971. The scaled scores have a mean of 500 and a standard deviation of 100 based upon the original standardization of 12,441 applicants tested in 1951. All subsequent forms of the Medical College Admission Test have been scaled to yield equivalent scores. Since 1951, the general trend of MCAT performance has been upward, presumably due to the improved scholastic preparation of the more recent applicants.

An examinee's percentile score for a subtest indicates the percentage of those taking the MCAT in the same year who did less well than the examinees on that subtest. For example, a person obtaining a percentile score of 70 on a given subtest has outperformed 70 percent of all current examinees while 29 percent have outperformed him on the same subtest. Actually, percentile bands rather than exact percentiles are reported.

Grade point averages of two applicants may be identical but may not represent the same quality of work when the applicants have attended different schools. Even within the same school, differing standards may be imposed by different degree programs and different sets of teachers. Nevertheless, the college academic performance remains the most valid single predictor of success in medical school. Success here is being defined as the ability to complete the medical curriculum satisfactorily, not the grade point achievement in medical school.

In contrast, the Medical College Admission Test scores do give a standardized means of comparing applicants. Yet, MCAT scores are not absolute, either. Performance may be drastically affected by social, economic, and educational background.

Neither the grade point average nor Medical College Admission Test scores are an eliminating factor for admission. However, noncompetitive grade point performance coupled with noncompetitive MCAT performance may result in the rejection of an applicant regardless of the quality of other attributes.

Table 15 and Table 16 give composite pictures of the grade point averages and MCAT scores of the 1974 applicants to The University of Texas System medical schools and of the 1974 Texas resident applicants to Baylor College of Medicine.

Sex

The rules and regulations of medical schools in Texas prohibit discrimination either in favor of or against any person on the basis of race, creed, color, or sex. However, many physicians and counselors in the past have been reluctant to advise women to pursue an interest in medicine.

The number of female applicants has risen steadily in recent years, both nationally and statewide. Nationally, 20.35 percent of all applicants to the 1974 classes were women. In Texas, 20.43 percent of Baylor College of Medicine's applicants, 18.01 percent of applicants to The University of Texas System schools, and 14.12 percent of Texas Tech University School of Medicine's applicants were women. While this is far less than half of the applicant pool, the percentage of women entering medical school mirrors the percentage applying. On a national basis, 22.19 percent of the 1974 entering classes were women. Texas figures are similar. Women comprised 30.23 percent of Texas Tech's

TABLE 15

GPA AND MCAT SCORES OF TEXAS RESIDENT APPLICANTS, 1974
BAYLOR COLLEGE OF MEDICINE

DISTRIBUTION BY GRADE POINT AVERAGE

GPA RANGE	NUMBER	PERCENT
4.00-3.76	156	14.05
3.75-3.60	129	11.62
3.59-3.51	66	5.95
3.50-3.41	115	10.36
3.40-3.31	99	8.92
3.30-3.16	143	12.88
3.15-3 01	111	10.00
3.00 & UNDER	290	26.13
NONE	1	0.09
TOTAL	1,110	100.00

DISTRIBUTION BY AVERAGE OF ALL FOUR MEDICAL COLLEGE ADMISSIONS TEST SCORES

RANGE	NUMBER	PERCENT
OVER 651	47	4.23
601 - 650	213	19.19
576 - 600	160	14.41
551 - 575	150	13.51
526 - 550	155	13.96
501 - 525	123	11.08
451 -500	153	13.78
UNDER 450	103	9.28
NOT KNOWN	6	0.54
TOTAL	1,110	100.00

DISTRIBUTION BY MCAT AVERAGE AND GRADE POINT AVERAGE

GPA RANGE UPPER LIMIT - 4.00 MCAT RANGE	3.75	3.59	3.50	3.40	3.30	3.15	3.00	2.75	2.59	NONE	TOTAL
OVER 700	1	2	1		1				1		6
651 - 700	13	9	2	4	2	2	3	3	2	1	41
601 - 650	45	36	16	26	12	29	17	18	1	12	1 213
576 - 600	27	19	10	11	23	18	19	18	8	7	160
551 - 575	16	21	13	19	18	16	12	15	11	9	150
526 - 550	33	12	12	16	13	21	13	18	9	8	155
501 - 525	14	14	6	13	12	19	13	16	7	9	123
451 - 500	4	14	5	22	12	25	22	21	13	15	153
401 - 450	2	1		4	3	8	7	11	7	19	62
UNDER 401	1	1	1		3	4	5	4	10	12	41
NOT KNOWN						1		3	1	1	6
TOTAL	156	129	66	115	99	143	111	127	70	93	1 1,110

SOURCE: Baylor College of Medicine

TABLE 16

GPA AND MCAT SCORES OF APPLICANTS TO UT SYSTEM MEDICAL SCHOOLS, 1974

DISTRIBUTION BY GRADE POINT AVERAGE

GPA RANGE	NUMBER	PERCENT
4.00-3.76	309	11.41
3.75-3.60	245	9.04
3.59-3.51	190	7.01
3.50-3.41	252	9.30
3.40-3.31	258	9.52
3.30-3.16	393	14.51
3.15-3.01	295	10.89
3.00 & UNDER	767	28.31
TOTAL	2,709	100.00

DISTRIBUTION BY AVERAGE OF ALL FOUR MEDICAL COLLEGE ADMISSIONS TEST SCORES

RANGE	NUMBER	PERCENT
OVER 651	116	4.28
601 - 650	449	16.57
576 - 600	380	14.03
551 - 575	390	14.40
526 - 550	382	14.10
501 - 525	313	11.55
451 - 500	407	15.02
UNDER 450	229	8.45
NOT KNOWN	43	1.59
TOTAL	2,709	100.00

DISTRIBUTION BY MCAT AVERAGE AND GRADE POINT AVERAGE

GPA RANGE UPPER LIMIT - 4.00 / MCAT RANGE	3.75	3.59	3.50	3.40	3.30	3.15	3.00	2.75	2.59	NONE	TOTAL
OVER 700	1	2		1					2		6
651 - 700	25	13	8	12	10	15	7	14	2	4	110
601 - 650	84	44	39	46	34	61	43	56	14	26	2	449
576 - 600	54	39	25	31	40	61	47	47	18	17	1	380
551 - 575	42	36	38	39	46	59	38	51	17	24		390
526 - 550	43	41	27	37	39	55	47	55	15	16	1	382
501 - 525	32	29	29	29	33	39	31	44	15	31	1	313
451 - 500	17	33	12	46	36	66	58	65	39	35		407
401 - 450	3	7	5	6	15	22	16	26	21	32		153
UNDER 401	1		5		2	7	6	8	16	30	1	76
NOT KNOWN	1	1	2	5	3	8	2	3	5	13		43
TOTAL	309	245	190	252	258	393	295	369	162	230	6	2,709

SOURCE: The UT System Medical and Dental Application Center.

entering class; 21.43 percent of Baylor's; 18.32 percent of The University of Texas schools; and 11.67 percent of Texas College of Osteopathic Medicine's first-year class.

Minority Groups

Committees on admissions recognize the necessity for producing more physicians from the various minority groups. Unfortunately, admission of minority applicants remains low. This is the result of the limited number of applications received from minority students and the relatively poor qualifications of many of these applicants on comparative bases.

Applications received from Mexican-Americans for the 1974 entering classes by the various schools in Texas ranged from 6.03 percent at Texas Tech to 4.12 percent at Baylor. Currently enrolled in 1974 first-year classes in Texas are 36 Mexican-Americans in The University of Texas System schools (6.28 percent) and 13 at Baylor (7.74 percent).

In 1973, however, 24 percent of all Mexican-American students attending medical schools in the United States were enrolled in Texas medical schools.[2]

Applications were received by Baylor College of Medicine for the 1974 entering class from 387 Black students; by The University of Texas System schools from 75 Black students; and by Texas Tech from 66 Blacks.

Black students in Baylor's 1974 entering class number 13, or 7.74 percent; and in The UT schools, 18, or 3.14 percent.

Total minority entering class enrollment in Texas Tech University School of Medicine for 1974 is 11, or 25.58 percent.

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[2]Medical School Admission Requirements, 1975-76, U.S.A. and Canada (Washington, D.C.: Association of American Medical Colleges, 1974), Tables 6-B, 6-C, 6-D.

Figures demonstrate that qualified and competitive students from minority groups are offered admission and that attempts to increase the number of qualified applicants from minority groups are slowly succeeding. It is hoped that Texas medical schools will attract a greater number of the minority applicants, as a disparity exists between the number of such students offered admission and the number who actually enroll.

Progeny of Physicians

A commonly held belief is that sons and daughters of physicians are given special consideration for admission to the schools of medicine. Although several students at each school every year are children of physicians, the profession of the parents is not a factor in the selection of the students. In some instances, these individuals have a slight advantage because of their familiarity with terminology. The advantage is usually reflected in the science and verbal portions of the MCAT. The home environment may influence the individual's ability to express his motivation and dedication to medicine to his advantage.

Letters of Recommendation

Some applicants and/or their parents apparently believe that letters of recommendation from prominent people play an extremely large role in the admission process. It is not unusual for a school to receive numerous letters of recommendation from prominent citizens after an applicant has already been notified of acceptance or rejection. Letters representing an objective appraisal of an applicant are used to some extent. However, only a letter of evaluation from the preprofessional committee of the college or university where the applicant is enrolled is required.

Legal Residents

There is one discriminating factor which is applied by most committees on admission in Texas. The University of Texas System schools and Texas Tech University School of Medicine, for instance, are limited by a legislative act in the number of nonresident applicants who can be accepted for admission without losing financial support. A nonresident applicant is a student who is not a legal resident of the State of Texas as defined by the Rules and Regulations for Determining Residence Status issued by the Coordinating Board. At present, the maximum number of nonresident students permitted in a school's total enrollment before penalty is 10 percent. Applied to entering classes, this maximum would be 57 for the four schools in The University System, and four for Texas Tech. In practice, The University of Texas System's committees on admissions only offer positions to nonresident applicants who are in the upper 10 percent of the applicant pool for both grade point average and Medical College Admission Test scores. None of Texas Tech's 1974 entering class members and only 27 of the University of Texas System schools' were nonresidents. In Texas College of Osteopathic Medicine's entering class, only five of 60 first-year students were nonresidents.

Age

Texas medical schools have not defined an upper age limit beyond which no applicant is admitted. Age is considered along with the other factors. It is generally true that the probability of gaining admission diminishes as age over 30 increases, but a few students who are over 30 years of age enter each year. These students are admitted because of favorable consideration of all criteria. While the average age of Texas Tech's 1974 entering class is 23, three members of that class are 30 years of age or over. The University

of Texas schools enrolled 22 students 30 years or over in 1974, and TCOM accepted three students in that age category.

Summary

The number of applicants far exceeds the number of positions available in the State of Texas and elsewhere. Evidence indicates that the full development of the new medical schools in Texas will not exhaust the number of qualified applicants. Medical schools in the United States have been in the position of being able to select a few thousand of the most highly competitive applicants from among several times as many well-qualified applicants. Texas medical schools are no different and can be expected to receive an increased number of well-qualified applicants for the next few years. It is most likely that admission will continue to be based upon the total qualifications of given applicants in competition with the individual qualifications of all other applicants.

Dental School Admissions

The three dental schools in Texas have enrolled a total of 288 students in their 1974 entering classes. These students were selected from approximately 1,900 applications. A significant number of prospective students made an application to all three schools. Evidence of a growing number of requests for admission from individuals who meet the minimum academic requirements is seen in Tables 17 and 18.

TABLE 17

TOTAL APPLICATIONS RECEIVED
THE UNIVERSITY OF TEXAS DENTAL BRANCH AT HOUSTON
1968-1974

Year	Number
1968-69	289
1969-70	354
1970-71	448
1971-72	476
1972-73	561
1973-74	630
1974-75	821

TABLE 18

TOTAL APPLICATIONS RECEIVED
BAYLOR COLLEGE OF DENTISTRY
DALLAS
1968-1974

Year	Number
1968-69	721
1969-70	719
1970-71	648
1971-72	664
1972-73	817
1973-74	930
1974-75	1,078

The average GPA for 130 accepted applicants in the 1974 entering class at Baylor College of Dentistry is 3.05; at the two University of Texas System dental schools for 158 entering students, the average is 3.32. The average Dental Admissions Test scores for Baylor's entering class are 4.6 (academic) and 5.3 (perceptual motor ability). University of Texas average DAT scores are 4.9 (academic) and 4.6 (PMAT).

Variations are present in requirements, methods, and procedures utilized by Baylor College of Dentistry and The University of Texas System schools, but the factors taken into consideration in the analysis of applications for admission are in general the same.

Academic Requirements

Minimum course requirements are as follows:

	Baylor	UT System
English	6 Sem. Hrs.	1 Year
Biology	8 Sem. Hrs.	2 Years
Inorganic Chemistry	8 Sem. Hrs.	1 Year
Organic Chemistry	8 Sem. Hrs.	1 Year
Physics	8 Sem. Hrs.	1 Year

Laboratory experiences are required in the biological sciences, chemistry, and physics. Baylor College of Dentistry requires that an applicant have a minimum of 90 semester hours credit, while The University of Texas System schools require a minimum of 60 semester hours. Most applicants select a major in the biological or physical sciences as a matter of choice. A degree program in any field is completely acceptable to admissions committees as long as the applicant has demonstrated overall quality performance and has shown proficiency in the biological and physical sciences.

Factors Considered in the Selection Process

For purposes of discussion it is necessary to list factors that admissions committees consider as single entities. However, in their analysis of an applicant, they look at the sum total of the components. There is some slight variation in emphasis on specific qualities from school to school, but in general the elements considered are as follows:

1) Academic achievement as reflected by overall grade point average and science or required course grade point average. At some point in the evaluation of the academic performance, a study is made of the pattern of academic progression or regression. The quality of the educational program and performance are assessed. They are examined as they relate to various factors that might influence the quality of performance such as magnitude of course load, illness, family problems, hours of employment, educational backgrounds, and the like.

2) Dental Admission Test Scores. To some extent this battery of tests places an applicant in competition with those from other schools. Results do not necessarily show an admissions committee how well a prospective dental student can do, but demonstrate that he or she can at least perform up to the level of the scores. In addition to the competitive elements involved, there are some portions of the DAT, such as perceptual ability, in which the applicant has to demonstrate at least a minimal level of proficiency before he or she can be considered to be qualified for dentistry. Poor results the first time an applicant takes the DAT does not necessarily mean that he or she could not be accepted in the future. However, the applicant's performance on a later test must be competitive.

3) Total educational experience as reflected by the total credit hours.

4) Employment activities, armed forces experience and any activities associated with the educational experience.

5) An analysis of recommendations from a preprofessional advisory committee and from other sources, and information obtained from personal interview are combined to determine moral character, persistence, the ability to communicate and get along with others. In addition, the ability to cope with a learning situation and some general judgments about motivation are utilized.

6) An analysis of any additional information that might reveal the individual's maturity, motivation, integrity and social awareness.

The first three listed components -- academic achievement, DAT scores, and total credit hours -- usually are utilized as an identification process to select applicants who should receive serious study and consideration by an admissions committee. In addition, the admissions committee makes a study of the remaining group of applicants to identify those who might not be competitive on the basis of the grade point average, but in the opinion of the admissions committee have good potential. The type of future student identified by this process includes those individuals who have had a low or mediocre academic record in the beginning years of their college work, but in the later years showed a marked improvement on a sustained basis. Individuals included in this group might be those who had poor secondary school training, people who had changed fields, individuals who had returned to school after armed forces experience, and all minority applicants. These types of persons are usually included in a group for a complete analysis by the admissions committee.

When there are a limited number of openings and a large number of applicants, it is necessary that an admissions committee reduce the number requesting admission to a group that will receive a more detailed analysis. While an interview is granted to any applicant who makes a request to be interviewed, the admissions committee usually restricts a personal hearing to those receiving serious consideration.

Within The University of Texas System, the selected group of competitive applicants are then ranked. Final selection of individuals to be offered positions is made. This selection is then challenged to determine if there is any discernible reason that the individual could not successfully practice dentistry.

The procedure at Baylor College of Dentistry is not so formalized. Baylor's admissions process does not include ranking of all candidates and then challenging the selection.

Admissions committee members base their judgments about an applicant on a competitive basis. The members of an admissions committee have diversified professional backgrounds and experience. While the individual member takes an overall look at a possible student, he usually takes a more detailed look at specific qualities of a prospect. Final judgments about an applicant become a composite picture from various professional viewpoints.

The number of applicants who have demonstrated high academic achievement and other desirable qualities available for the limited number of positions is of such magnitude that it is not probable that an individual with a mediocre academic record can compete. A review of those seeking admission to the 1974 entering classes at The University of Texas System schools in Table 19 and Table 20 reveals the magnitude of the problem.

The grade point average is calculated as follows: A=4.0, B=3.0, C=2.0, D=1.0, F=0. The overall average GPA for 158 accepted applicants who are enrolled in the 1974 entering classes of The University of Texas System is 3.32. Approximately 245 applicants with a "B" average or better failed to gain admission to a University of Texas System school. Some of these applicants by choice will be in the entering class at Baylor.

TABLE 19

GRADE POINT DISTRIBUTION
THE UNIVERSITY OF TEXAS SYSTEM DENTAL SCHOOLS
1974 APPLICANTS

Range	Number	Percentage
4.00 - 3.76	28	3.34
3.75 - 3.60	23	2.74
3.59 - 3.51	31	3.69
3.50 - 3.41	42	5.01
3.40 - 3.31	61	7.27
3.30 - 3.16	103	12.29
3.15 - 3.01	113	13.48
3.00 & Under	437	52.12

The Dental Admission Test consists of four examinations. Included are:

I. Survey of Natural Sciences (Biology, Inorganic, Organic Chemistry)
II. Reading Comprehension (Natural and Basic Sciences)
III. Verbal and Quantitative Ability
IV. Test of Perceptual Motor Ability (two and three dimensional problem solving)

Scores used in the testing program range from a -1 to +9. While there is no strict passing or failing score, the coded score of four signifies average performance on a national basis. The average scores for 158 accepted applicants currently scheduled in the 1974 entering classes of The University of Texas System are 5.0 for the academic portion and 4.6 for the manual portion. A noncompetitive grade point average coupled with noncompetitive DAT scores, unless there is evidence of a strong academic progression pattern, will result in the rejection of an applicant.

TABLE 20

DENTAL ADMISSION TEST SCORE DISTRIBUTION
THE UNIVERSITY OF TEXAS SYSTEM
1974 APPLICANTS

Score	Academic Average		Manual Average	
	Number	Percentage	Number	Percentage
7 to 9	33	3.93	90	10.73
6	115	13.72	131	16.63
5	247	29.47	192	22.91
4	234	27.92	187	22.31
3	117	13.96	130	15.51
2	47	5.60	55	6.56
1 to -1	5	0.59	11	1.31
None	40	4.00	42	5.00

Special Groups

Tables 21 and 22, in general, reveal the current situation so far as special groups are concerned.

TABLE 21

THE UNIVERSITY OF TEXAS DENTAL BRANCH AT HOUSTON
1974 SPECIAL GROUP REPRESENTATION

	Applicants	Positions Offered	Withdrew After Acceptance	Withdrew Before Acceptance
Black	7	3	1	1
Mexican-American	28	9	2	4
Women	46	9	2	2

TABLE 22

BAYLOR COLLEGE OF DENTISTRY
1974 SPECIAL GROUP REPRESENTATION

	Applicants	Positions Offered	Withdrew After Acceptance	Withdrew Before Acceptance
Black	13	3	0	0
Mexican-American	16	4	1	1
Women	37	11	0	0

The number of female applicants has shown a steady increase over the past several years. In 1968, five women applied to The University of Texas Dental Branch at Houston. In 1974, 46 women applied. The percentage of the total number of those requesting admission is still very low (in 1974, 5.5 percent at the Houston school). The number of Mexican-American applicants at the same school increased from seven in 1968 to 28 in 1974, although the percentage remained low (3.4 percent of the total applicants). At the UT Dental Branch, the number of Black applicants has not changed significantly through the years.

The experience of Baylor College of Dentistry is illustrated in the following table.

TABLE 23

COMPARISON OF SPECIAL GROUP REPRESENTATION
BAYLOR COLLEGE OF DENTISTRY
1968-1974 APPLICANTS

	Black	Mexican-American	Women
1968-69	1	10	4
1969-70	4	8	6
1970-71	1	7	3
1971-72	2	3	7
1972-73	3	11	9
1973-74	11	8	10
1974-75	13	16	37

Availability of significant numbers of qualified students is a major reason that there is not a greater minority representation in dental schools. Health career education at an early stage of the educational process has been lacking or has been ineffective in this segment of the population. This is particularly true so far as potential Black applicants are concerned.

A major problem is the loss through recruitment by business and industry of potential students with competitive qualifications. Potential applicants are being offered executive trainee positions at $8,000 to $10,000 a year, while professional schools are offering additional years of training that involve expense.

An additional cause is the loss of competitive minority applications to the more glamorous profession of medicine. The University of Texas Dental Branch at Houston offered positions to six Black applicants in 1973. Five of the six chose to enter medical school.

Letters of Recommendation

Letters of recommendation from any source are reviewed by admissions committees in their analysis of prospective students. These letters are examined as to their objectivity, source, and as to the area of knowledge and expertise of the person making the recommendations. The major sources of information about an applicant that are utilized are the preprofessional committee; teachers from the school where the applicant is or has been enrolled; a supervising employer; or a commanding officer for the individual who has recently or is currently serving in a branch of the armed forces.

Conclusion

The number of applicants with competitive qualities continues to increase each year. The supply of candidates with competitive qualifications will not

be exhausted even though the number of available positions increased in the future. The University of Texas Dental School at San Antonio has tentative plans to increase its entering class in 1975 from the present 34 to 152. Dependent upon additional capital outlay, Baylor College of Dentistry also plans to increase its entering class size from 130 to 150.

Any set of criteria established by an admissions committee will result in criticism from some segment of society. It is equally probable that the major source of criticism of admissions procedures and committees will continue to be from qualified applicants who cannot quite meet the competition, or from their advocates. Unless admissions committees are successful in selecting prospective students who are socially aware and humanistically oriented, the ultimate criticism will be from the public.

Noncognitive factors no doubt will receive increased emphasis by admissions committees in the future. Since the basis for decisions regarding noncognitive factors is by its nature highly subjective, it is to be expected that those decisions too will be subject to criticism.

CII

UNDERREPRESENTATION OF MINORITY STUDENTS IN
MEDICAL AND DENTAL SCHOOLS IN TEXAS

SPECIAL SUBCOMMITTEE ON MINORITY STUDENTS
IN MEDICAL AND DENTAL SCHOOLS IN TEXAS

Crispin Sanchez, Ph.D., Chairman
Dean of Student Personnel
Laredo Junior College

Gilberto de los Santos, Ph.D.
Dean of Instruction for
Research and Development
El Paso Community College

Exalton Delco, Ph.D.
Dean of the College
Huston-Tillotson College
Austin

Dolores Hunter, Ph.D.
Associate Director
Office of Equal Opportunity
The University of Texas System
Houston

Ira Iscoe, Ph.D.
Director, Counseling-
Psychological Services Center
The University of Texas at Austin

Carlos Pestana, Ph.D., M.D.
Assistant Dean and Chairman of
Admissions Committee
The University of Texas Medical
School at San Antonio

Billy Rankin
Former Director, Medical and
Dental Application Center
The University of Texas System
Austin

UNDERREPRESENTATION OF MINORITY STUDENTS IN MEDICAL AND DENTAL SCHOOLS IN TEXAS

The Advisory Committee on Medical and Dental Education with its complementary Task Force was charged with the task of investigating medical and dental educational requirements for Texas through 1980.

As the studies developed, it became apparent that compensatory education programs were needed for Mexican Americans and Blacks who wish to enter the health professions but whose backgrounds make it difficult for them to be accepted by medical or dental schools under the present entrance procedures, or if accepted, to complete their training successfully.

Therefore, the Coordinating Board appointed a special subcommittee to study the motivation, recruitment, admittance, and persistence needs of prospective premedical and predental students. The committee was also to consider related difficulties besetting medical and dental students after enrollment in professional schools.

The committee was asked especially to seek solutions to the problems of young persons who find themselves handicapped through limitations imposed on them by present elementary, secondary, and baccalaureate education; sex or ethnic group membership; or socioeconomic status.

The Special Subcommittee on the Underrepresentation of Minority Students in Medical and Dental Schools in Texas, under the chairmanship of Dr. Crispin Sanchez, Dean of Student Personnel Services, Laredo Junior College, has considered the problems of students from groups with a heritage of limited acceptance and success in medical and dental schools in Texas. Mexican Americans and Blacks compose two of the groups traditionally underrepresented in the state's medical and dental schools.

The committee then directed itself to the task of making recommendations which would help to equalize the distribution of Texas physicians and dentists by ethnicity. Because women are also underrepresented in health professions schools, the need to stimulate increased applications from this group also was investigated. The procedure has been to analyze data and to seek methods to alleviate the underrepresentation in particular of Mexican Americans, Blacks, and women in the state's medical and dental schools.

The American Association of Medical Colleges' Task Force recommendations[1] to increase enrollment for underrepresented groups have been endorsed by the federal administration, as well as almost every major professional organization. However, in spite of some progress, the underrepresentation of Mexican Americans, Blacks, and women is still prevalent in the professions.

The committee studied data related to enrollment by ethnic group and sex in Texas medical schools for the years 1971-72 through 1973-74 and by sex for 1969-70 through 1973-74. (See Tables following this section.)

In 1973-74 Mexican American enrollment in Texas medical schools was 4.1 percent of the total enrollment, reflecting an increase of 1.0 percent over a three-year period. For the same year, Black enrollment totaled 2.3 percent of total enrollment, an increase of 0.9 percent for the three-year period. The enrollment of women in Texas medical schools for 1973-74 was 12.8 percent of the total enrollment, showing an increase of 4.7 percent for the five-year period. During that time, total enrollment of medical schools in the state had increased 60.5 percent.

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[1]Reuben Barr, "Do Medical Schools Play Fair with Minorities?" Hospital Physician, August, 1971.

The report of a recent study sponsored by the U.S. Department of Health, Education, and Welfare[2] reveals the importation of large numbers of foreign-trained physicians. Among the HEW findings are the following:

1) More foreign physicians are admitted to the United States each year than are graduated from U.S. medical schools.
2) One of every six doctors now practicing in the United States received his or her training outside the U.S. and Canada.
3) One-third of all staff doctors in hospitals with approved graduate-education programs are foreign-trained physicians.
4) Foreign physicians admitted to the U.S., either as immigrants or as visitors to receive specialist-training, totaled 10,540 in 1971.
5) Graduates of U.S. medical schools in the same year totaled 8,974.
6) Many of the unsuccessful applicants to U.S. medical schools have a much better basic premedical education than many foreign medical graduates who are imported from abroad as interns. Yet there are now nearly two internship posts available for every American medical graduate.

The report summarizes the situation in this way:

"One of every six physicians now practicing in the United States is a graduate of a medical school outside the United States and Canada.

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[2]Rosemary Stevens and Joan Vermeulen, Foreign Trained Physicians and American Medicine (U.S. Department of Health, Education, and Welfare, Public Health Service--National Institutes of Health. Washington, D.C.: U.S. Government Printing Office, June 1972).

Altogether, if Canadian graduates are included, there are more than 63,000 foreign-trained physicians in the United States."

If the supply of United States physicians is becoming increasingly dependent upon foreign-trained doctors, it may be appropriate for the United States including Texas, to assume more responsibility for educating its own physicians. If entering classes were expanded to offset this growing influx of physicians educated abroad, it may be assumed that an increasing percentage of those students entering medical school could be women and members of ethnic minority groups.

After several meetings, discussion, and correspondence, the Sanchez committee concluded that medical and dental schools in the State of Texas are not purposely keeping anyone from being accepted into medical or dental school, even though present admissions procedures may not seem to be the best for all applicants.

Nevertheless, the committee felt that any revision of present admissions procedures should be undertaken by the individual medical and dental schools.

The committee concluded that if Texas is to assure an increasing percentage of qualified, competent women and minority candidates for medical and dental schools, studies and projections with the appropriate funding must be devised and implemented at all levels of education: junior high, high school, and college. It will be necessary to develop a process for the early identification of potential minority and women candidates to be initiated throughout the state at the various levels of education. The committee further recommends consideration of a compensatory program at the post-baccalaureate level to assist current unsuccessful medical and dental school applicants who could reapply the following year.

Recommendations for consideration by the Coordinating Board are included in the section on Summary of Recommendations. It is hoped that these recommendations, if accepted, will provide corrective actions which the committee believes are necessary if equal opportunities for Mexican Americans and Blacks in medicine and dentistry are to be realized in Texas.

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TABLE 24

COMPARATIVE DATA REGARDING THE UTILIZATION OF POSTSECONDARY EDUCATIONAL OPPORTUNITIES IN TEXAS

	Black	Spanish Surnamed	Subtotal	All Others	Total	% of Total Population
Total Texas Population	12.7% (1,419,677)	18.4% (2,059,671)	31.0% (3,479,348)	68.9% (7,717,382)	100% (11,196,730)	100.0000%
Texas Residents in College	7.3% (25,720)	10.4% (36,428)	17.7% (62,148)	82.3% (288,520)	100% (350,668)	3.1318%
Applicants to UT Medical Schools	2.1% (41)	4.4% (87)	6.5% (128)	93.5% (1,854)	100% (1,982)	0.0177%
Applicants to UT Dental Schools	2.1% (12)	3.0% (17)	4.1% (29)	95.9% (536)	100% (565)	0.0050%
Enrolled in UT Medical Schools	2.4% (12)	4.7% (23)	7.1% (35)	92.9% (456)	100% (491)	0.0043%
Enrolled in UT Dental Schools	1.3% (2)	4.5% (7)	5.8% (9)	94.2% (146)	100% (156)	0.0013%

Data from 1970 census and The University of Texas System Professional Schools entering class of 1972. The 1970 census data should be regarded as illustrative rather than definitive.

SOURCE: The University of Texas Medical and Dental Application Center.

TABLE 25

MINORITY ENROLLMENT IN UNITED STATES MEDICAL SCHOOLS

	1971-72		1972-73		1973-74	
	Number Enrolled	% of Total	Number Enrolled	% of Total	Number Enrolled	% of Total
In first-year classes:*						
All students	12,361	100.0%	13,677	100.0%	14,124	100.0%
Blacks	882	7.1%	957	7.0%	1,023	7.2%
Mexican Americans	118	1.0%	137	1.0%	174	1.2%
In all classes:						
All students	43,650	100.0%	47,366	100.0%	50,716	100.0%
Blacks	2,055	4.7%	2,582	5.4%	3,045	6.0%
Mexican Americans	252	.6%	361	.8%	496	1.0%

*Includes repeaters and transfers.

SOURCE: Division of Student Studies, Association of American Medical Colleges, One Dupont Circle, Washington, D.C.

TABLE 26

MINORITY ENROLLMENT IN TEXAS MEDICAL SCHOOLS

	1971-72		1972-73		1973-74	
	Number Enrolled	% of Total	Number Enrolled	% of Total	Number Enrolled	% of Total
In first-year classes:*						
All students	570	100.0%	709	100.0%	739	100.0%
Blacks	18	3.2%	21	3.0%	25	3.4%
Mexican Americans	28	4.9%	32	4.5%	32	4.3%
In all classes:						
All students	1,948	100.0%	2,310	100.0%	2,537	100.0%
Blacks	27	1.4%	39	1.7%	58	2.3%
Mexican Americans	60	3.1%	84	3.6%	105	4.1%

*Includes repeaters and transfers.

SOURCE: Division of Student Studies, Association of American Medical Colleges, One Dupont Circle, Washington, D.C.

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TABLE 27

ENROLLMENT IN UNITED STATES MEDICAL SCHOOLS BY SEX

	Men		Women	
	Number	Percent	Number	Percent
In first-year classes:				
1969-70 (101 Schools)	9,474	90.9%	948	9.1%
1970-71 (102 Schools)	10,092	88.9%	1,256	11.1%
1971-72 (108 Schools)	10,668	86.3%	1,693	13.7%
1972-73 (112 Schools)	11,377	83.2%	2,300	16.8%
1973-74 (114 Schools)	11,338	80.3%	2,786	19.7%
In all classes:				
1969-70	34,298	91.0%	3,392	9.0%
1970-71	36,360	90.4%	3,878	9.6%
1971-72	38,895	89.1%	4,755	10.9%
1972-73	41,284	87.2%	6,082	12.8%
1973-74	42,892	84.6%	7,824	15.4%

SOURCE: Division of Student Studies, Association of American Medical Colleges, One Dupont Circle, Washington, D.C.

TABLE 28

ENROLLMENT IN TEXAS MEDICAL SCHOOLS BY SEX

	Men		Women	
	Number	Percent	Number	Percent
In first-year classes:				
1969-70 (4 Schools)	428	91.1%	42	8.9%
1970-71 (5 Schools)	491	92.1%	42	7.9%
1971-72 (5 Schools)	520	88.7%	66	11.3%
1972-73 (6 Schools)	606	86.7%	93	13.3%
1973-74 (6 Schools)	615	84.0%	117	16.0%
In all classes:				
1969-70	1,477	91.9%	131	8.1%
1970-71	1,627	92.1%	139	7.9%
1971-72	1,806	91.1%	177	8.9%
1972-73	2,064	89.5%	242	10.5%
1973-74	2,258	87.6%	319	12.4%

SOURCE: Coordinating Board, Texas College and University System

TABLE 29

APPLICANTS AND ENTERING CLASSES IN UT MEDICAL SCHOOLS BY SEX
1970-1973

	Men				Women			
	Number Applicants	Percent	Enrolled	Percent	Applicants	Percent	Enrolled	Percent
1970	1,135	90.8%	357	91.3%	115	9.2%	34	8.7%
1971	1,296	88.5%	384	89.1%	168	11.5%	47	10.9%
1972	1,721	86.8%	423	86.2%	261	13.2%	68	13.8%
1973	1,909	84.5%	445	85.1%	351	15.5%	78	14.9%

SOURCE: The University of Texas System Medical and Dental Application Center

EDUCATIONAL METHODOLOGIES: FACILITIES, EQUIPMENT, TECHNIQUES, AND TYPES OF LOCATIONS

STUDY SUBCOMMITTEES ON METHODOLOGIES: FACILITIES, EQUIPMENT, TECHNIQUES, AND TYPES OF LOCATIONS

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Trustee, American Osteopathic Association
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EDUCATIONAL METHODOLOGIES: FACILITIES, EQUIPMENT, TECHNIQUES, AND TYPES OF LOCATION

More efficient and effective educational programs in health professions schools are needed to increase flexibility, reduce cost and learner time, and provide medical and dental students with problem-solving-based curricula. Health science educational planners and developers must translate learning situations into goals and objectives which are performance-based. Plans for the development and management of the learner environment are essential. Measurement and evaluation systems based on student performance should be established.

Human behavior is characterized by both continuity and change. It has been described as a kaleidoscopic pattern with constant blending of actions and of environments. Experimental analysis of behavior has affected the technology of teaching and offers planners a redefinition of the needs of students as well as the goals of teaching and of learning.

B. F. Skinner points out that the tasks of the teacher are to 1) impart information, 2) train the mind, 3) help the student grasp relations, 4) teach the arts, 5) encourage creativity, and 6) change attitudes. But, Skinner continues, "the teacher does not act upon the mind or its faculties, or upon the character or personality. He acts upon the behavior of the student, and he does so by changing the verbal and non-verbal environment in which the student lives."[1]

This and other approaches to more open curriculum with greater inclusion and integration of instructional settings have forced teachers to realize that

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[1] B.F. Skinner, "Some Implications of Making Education More Efficient, Behavior in Education," The Seventy-second Yearbook of the National Society for the Study of Education, p. 451.

the classroom is not the sole center for learning. These demands suggest a reexamination of in-service education for medical and dental school faculties to consider new dimensions of instructional technology.

Leadership assumes a new importance in a time when great changes are being made and even greater changes are demanded. New educational practices are being evolved. As yet, they are apparently not being diffused rapidly to a majority of faculties in health science institutions. Teachers, no matter how wise and skillful, stand in a poor strategic position to bring change by their lone efforts. Coordinated assistance and leadership offer more to allow the faculty member to meet change and to become a change agent himself.

Ways must be found to link instructional decision-making to explicit objectives. Educational planners should assist in judgment whether a treatment is good or poor and whether it should be continued or discouraged. In addition, effort for assessment of minimum competency levels in learning is essential if evaluation and improvement of educational programs are to occur. Instructional development principles and procedures, when applied, must offer a high probability of success to teaching and learning.

Rationale and Needs

A discussion of medical and dental education for the future calls for exploration of new educational methodologies and program development techniques. Operational definitions are required, and concepts must be tested. Texas medical and dental school educators have a rare opportunity to become personally involved in curriculum development processes.

Change in methodologies of medical and dental education requires:

- A high level of faculty involvement in systematic reexamination of instructional goals

- Reorganization of course content and modes of instruction
- Optimum use of educational technology
- Careful evaluation to determine the efficiency and effectiveness of "ongoing" procedures

The inherent functions of health professional schools are teaching, service, and research. These schools are dependent for their successful achievement upon the excellence of their faculties, regional resources, and facilities and equipment.

The decade of the seventies has been referred to by the Carnegie Commission of Higher Education as the fourth great revolution,[2] brought about by the development of electronics (radio, television, tape recorder, and computer).[3]

Seth Spaulding of UNESCO has expressed a generally accepted international concept of educational technology. He has emphasized technology as an essential resource to the teacher and to the learner.

> A true technology of education includes the entire process of setting goals, the continuous renewal of curriculum, the trying out of alternate strategies and materials, the evaluation of the system as a whole and the resetting of goals as new information on the effect of the system is known.[4]

Spaulding's definition suggests an improvement of instruction process, if changes promise to be better and more efficient and if those involved are willing to participate in change and adaptation. The incorporation and continuance of a particular innovation in medical and dental schools can be insured through in-service programs which train teachers to help themselves.

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[2]According to the Carnegie Commission on Higher Education, the previous technological revolutions were 1) when the task of teaching the young was shifted from the parent to the teacher; 2) when written word was adopted as a tool of education, and 3) the advent of the printing press and books.

[3]The Fourth Revolution (New York: McGraw-Hill Book Co., 1972).

[4]James F. Tierney, Communications Technology and the Crises in Education, Report on the Bahia Workshop (Council on Higher Education in the American Republic, 1971), p. 5.

Major concerns in medical and dental education have developed on a national scale. Among these are:

- Identification of essential course content
- Systematization of content
- Sequential arrangement of content relocation
- Early and ongoing clincial participation
- Utilization of audiovisual communication and programmed instruction
- Implementation of self-directed methodologies

A few schools have recognized these concerns and have acted to seek their implementation over a period of years. Some have turned to instructional technology systems for answers.

Systems in educational technology are a logical sequential process. They can provide an orderly plan for making man-machine instructional decisions. They can assure careful selection of instructional media which contribute to student mastery of the stated performance objectives. Multimedia technology, used as a result of organized planning, will become basic to the learning process and the mode of instruction. A learning system will include all personnel, hardware, buildings, software, and procedures necessary to achieve a particular learning objective.

Systems emphasize relationships among instructor, learner, material, and machine. The instructor determines the content. The developer and other specialists assist him in arranging the learner's environment. The nature of the learning problem and the type of curriculum also contribute to selection of a system. The media types for a scheduled, teacher-centered, four-year curriculum would be different from those needed in a non-scheduled, self-directed curriculum. Therefore, the relationship of the various components will change with the system. Production and selection of resources and

faculty management of the learner environment will differ from one system to another.

Planners identify the products and select the resources basic to the development of dentists and physicians. Student behavior must be anticipated. Judgments then can be made concerning curriculum core content, sequence, and modes of instruction which dictate needs for learner space, simulation, hardware, and software. When instructional decision-making is linked to explicit learner objectives, the implications of instructional technology to medical and dental education become apparent. For these reasons, many medical and dental schools have appointed instructional developers to organize and implement teaching and learning systems for particular sets of learner objectives.

The Student and the Learning Task

Health professions education is a life-long activity. Consequently, students of these areas may be divided into three categories: full-time, part-time, and some-time.

The full-time student participates in a formal education program in a central location.

The part-time student usually is a career-ladder aspirant. He often is economically deprived and/or a member of one of society's subcultures. If he is talented or interested in a health career, he requires special help to be brought toward the main stream of the profession.

The some-time student is the health care practitioner who needs to stay abreast of new findings and techniques, or adult layman. Their education may be complicated by distance from the source of information and/or the amount and distribution of time available. They have to go to the information/learning source, or it must be brought to them.

Education is a "continuous production technique," not mass production using the lock-step methods of the past.

Learning may be categorized by the nature of the behavior sought. The five basic dimensions of learning are:

1) Motor skills

2) Verbal knowledge

3) Intellectual skills

4) Cognitive strategies

5) Attitude, values, and identification of different domains

Each dimension has a different entry and condition, including prerequisites for the learning task, acquisitions for the learning task, and level of learning at the entry point.

Planning for teaching and learning motor skills is probably the best understood of all of these dimensions. The objectives and products are obvious. Task analysis and simulation are generally much easier to identify and arrange. Early examples of systematic planning for psychomotor skills grew out of World War II, when a definite theory of learning resulted from the nature of the task.

Verbal knowledge, the second dimension, emphasizes the importance of specific facts. It requires less prerequisite input. Much of the learning is rote recall and association.

Intellectual skills, the third dimension, includes the process of summarization and synthesis. Task analysis is the process of moving from one position to other positions and comparing the changes. It includes classifying, analyzing, and disseminating sequenced instruction.

Cognitive strategy, the fourth dimension, is the process of selecting intellectual skills and determining when and how to use them. Much of this kind of learning is by discovery. The student works on a wide variety of

problems and has many opportunities to learn from failure or success in their solution.

Attitudes, values, and identification of the different domains that may exist comprise the final dimension. This kind of learning requires a variety of environmental conditions. It deals with responsibility, self-criticism, self-direction, and self-education. Peer teaching, present and future learning, and self-education are involved. Movement away from a standard scheduled curriculum is essential. A single perspective does not offer independence which is basic to the discovery of differences in people and situations. Interaction with a variety of persons and settings is the source of understanding.

The student is provided an opportunity to learn to meet conflict and to recognize what is required to resolve conflicts. Multiple objectives, not a single objective, are taught. Students become aware of a total instructional program. Emphasis is given to consistency, attitude, and information.

Instructional modes in medical and dental schools do not differ with individual styles of learning. The primary problem confronting the planner is the student's present knowledge. A good curriculum is any logical plan, with appropriate resources, to allow the student to pursue established learning goals and objectives.

Universal curricula and materials that would be appropriate across regional or local boundaries are difficult to identify. General theories cannot be translated into a universal methodology. Learning occurs in many ways, in many different places. The program and the process must be adapted to students and faculty within a state, a region, or a community.

Present Trends and Methodologies with Promise

The starting point for developing new methodologies is the medical or dental school's own distinctive goals and objectives. Teachers who will be learners with the students are also required.

The following assumptions have proven significant in shaping schools with open curricula:

1) The instructional designer is not a line or staff position. Rather, one or more persons may play the role. A teacher, a media professional, an audiovisual or library person, an instructional developer, a department head, a committee chairman, a dean, or a college president in a variety of combinations may be instructional designers.
2) The curriculum design may be teacher-centered (rate-constant) or student-centered (rate-variable).
3) "Performance-based curriculum" is the phrase of the future.
   a) Students will be guided by clearly stated performance-based measurable objectives.
   b) Students will be tested and evaluated by these same objectives.
4) Students are participants, not spectators.

If a teacher tells the students what they are to learn and at what level they are to perform, the students will most likely succeed. Students also teach each other. A student can learn without a teacher being present. But has a teacher taught if no learning takes place?

Trends for Consideration

Present trends in medical and dental education represent future trends. Ivan L. Bennett, M.D., in addressing the 83rd American Association of Medical Colleges at the annual meeting held in 1972, presented such a list.[5]

1) The integration of college and medical school experience which will culminate in an actual combination of college and medical

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[5]Ivan L. Bennett, "The Continuance of Medical Education," The Journal of Medical Education, pp. 41-42, January, 1973.

school to provide a single shortened 5, 6 or 7-year course of instruction leading to the M.D. degree

2) Integrated teaching between basic science and clinical departments with maintenance of strong and independent basic science departments and teaching programs

3) Early contact with patients as a meaningful aid to education of the student rather than as an overemphasis upon early "practical experience" to satisfy the desire of many students to become instant healers

4) Additional use of teaching machines and computers as adjuncts to the basic learning provided by student-teacher and student-patient relationships

5) A strong tendency to shorten the M.D. curriculum in response to external pressures and financial incentives:

   a) as an effort to economize, or

   b) because of an assumption that clinical medicine is learned during the internship and residency years

6) A movement toward abandoning the general clinical experience or the so-called freestanding internship which precedes graduate specialization should be earnestly assessed. Also, the determination and control of the house officer segment of physician education by medical schools rather than by self-perpetuating specialty boards

7) The introduction of greater and more meaningful components of ambulatory care in both hospital and community settings as an integral part of the clinical experience of students and house officers

8) The development of less rigid curricula, allowing greater engagement of the student in his own education under appropriate guidance. This includes continuing emphasis upon providing opportunities for original research, intensive clinical experience in a specialty of the student's choice, and elective experience in settings outside of the medical school and teaching hospital.

9) Exploration of the ways in which students can better understand themselves and their patients in terms of ethnicity, social background, and economic status; what the "human" impact of illness is; and how to cope with complex ethical problems and moral ambiguities. A continuing exploration should be included of the role of humanistic studies in broadening the horizons and perspective of the student, in acquainting him with the role of other professions in society, and in assisting him toward compassionate behavior.

A second reference on curriculum which holds promise for the future is the Seventieth Yearbook of the Society for the Study of Education. One of the authors stated, "A truly relevant education is one that inducts the young learner into participation in adult living." [6]

Curriculum Modes with Promise

Bruce R. Joyce describes curriculum modes which in his opinion have merit. [7] These are:

1) individual self-teaching

2) personal counseling and/or individual tutoring

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[6]Harold G. Shane, "Future - Planning as a Means of Shaping Educational Change," The Seventieth Yearbook of the National Society for the Study of Education, 1971, p. 197.

[7]Bruce R. Joyce, "The Curriculum Worker of the Future," Ibid., pp. 346-351.

3) group inquiry

He indicates that some educational objectives can be more clearly defined than others.

The individualized self-directed mode is appropriate in areas of curriculum in which there are:

1) a relatively stable agreement about cognitive or skill objectives;
2) adequate self-instructional devices constructed for the majority of students;
3) automated feedback systems developed to keep learners informed of progress;
4) subject matter learned as well alone as in a group;
5) pacing of instruction

The tutorial mode, Joyce suggests, is appropriate in areas of curriculum in which:

1) the learner defines his own objective in his personal quest for understanding and self-development;
2) personal counseling is needed to assure definition and availability of any special resources and to provide individual service which the learner requires;
3) personal interests are sufficiently congruent within group inquiry to serve both individual and group requirements

The group inquiry mode is useful when:

1) group skills and interdependence are acquired;
2) the learner wishes to test himself against the ideas of others;
3) group dynamics will serve as an important learning agent;
4) individual differences in a heterogeneous group will develop a vigorous interchange of ideas and points of view

Ongoing Dental and Medical School Programs

Promising methodologies and curriculum modes can be found in several ongoing medical and dental school programs in addition to those more generally described herein. Programs worthy of study include: 1) Florida University School of Dentistry, 2) Ohio State University College of Medicine, 3) University of Maryland College of Dentistry, 4) Purdue University, 5) Texas Tech University School of Medicine, and 6) The University of Texas Health Science Center at Houston, Dental Branch. An overview of the program of each of these schools may be found on pages 173-197.

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SUGGESTED METHODOLOGY CHANGES

Development of better ways to train and educate health personnel in Texas is as important as the recent thrust to increase numbers of health manpower personnel. Emphasis should be placed on instructional systems which foster quality of instruction and efficiency of time and cost.

What should be taught, how it should be taught, and how it should be learned are the major questions to be answered in problems of current methodology. Teaching and learning strategies should be identified and developed to assure that Texas medical and dental students will achieve the objective of delivering quality health care.

Suggested Methodology Procedures

Specific, detailed, measurable objectives for medical and dental education should be defined and documented. Each institution will, of necessity, define its own specific objectives and procedures. However, these should be placed into a statewide perspective of overall objectives through exchange of information with other institutions and with state planners. Individually identified objectives will assure academic autonomy of the various schools and colleges.

Objectives should remain relatively constant in the planning process. The variables should be based on the student's abilities. Curriculum should follow the "modular concept." Minimal clinical competencies should be established.

Systems to achieve objectives require definition by the institutions. Finally, methods of evaluating subject matter will increase the probability of continued quality training as changes are made in the educational system.

Self-directed methods of teaching and learning, in addition to traditional teacher-student relationships, should be applied to instructional strategies in medical and dental schools.

Categories of learning appropriate to education of health professionals include the following:

- Teacher and learner face-to-face, with support media and instructional technology
- The university without walls
- A modular, self-directed approach, in which the learner participates in a setting of health care delivery

Instructional strategies, including methods and procedures, can increase the effectiveness of the educational process. Behavioral objectives, in performance-based terms, should delineate the content to be mastered and the performance to be achieved.

Student motivation and desire should be a primary concern in planning teaching and learning environments, including both space and resources. The environment should be structured to permit self-paced development by the students. Within that framework, programs should emphasize quality education. Length of time for the programs should be based on the ability and learning rate of the student.

Planning for teaching and planning for learning are different. Variables other than aptitude for learning should be considered. Some of these variables are mode of instruction, readiness for learning, time for learning, and motivation. All are essential considerations in developing program changes.

More flexible transfer of credits and courses from one institution to another should be implemented. This involves coordination in curricular planning, so that essential course content and credit offered will be similar from one institution to another. This does not mean that individuality and autonomy are any less important.

Instructional strategies should also include continuing education for health professionals on a formal basis throughout their practicing careers. A "hands-on" technique of learning should be offered to the some-time student, the practitioner who returns to the medical center for continued training and for information about newly developed techniques. This part of continuing education should follow home study, in which quality standards of retention and knowledge have been met.

Undergraduates also should have part of their educational experience away from the medical center, after they have undergone a maturation process and have been prepared in the classroom. Such a "hands-on" program in satellite areas would help to increase the number of medical professionals who will return to practice in small community hospitals or as family physicians in underserved areas.

A system of zoning, developed by state planners in conjunction with individual institutions, would give a designated institution or group of institutions responsibility for education, continuing education, and health care delivery for a specific section of the state.

Health education for the general public has special significance in reducing dependence on health professionals in the future. Health education objectives and programs should be developed for kindergarten through twelfth grade and for higher education. The adult sector of the population, part-time and some-time students, as well as those no longer involved in formal education, needs health education programs to keep up with good nutritional habits, sanitation, the effects of drug and alcohol misuse and other forms of self-abuse, and preventive medicine and dentistry.

Facilities

Facilities needed for medical and dental education in the future must

be designed for changing curricular modes, with prevention and home care receiving greater emphasis.

Flexible building plans which can be easily remodeled, changed, or removed must be designed for comprehensive health care, including prevention, treatment, rehabilitation, and training for home care.

Equipment, Technology and Locations

A learning system includes personnel, hardware, buildings, software, and procedures to achieve a particular learning objective. Instructional strategies include the arrangement of these elements.

The terms "instructional materials" and "media" often are synonymous. They include any device, method, or experience used for teaching purposes.

For federal contracting requirements, audiovisual teaching support facilities have been defined as follows:

> Media. Those physical areas set aside for the planning, production and use of graphics, photography, films, videotapes, filmstrips, exhibits and other media used predominantly for instructional purposes (including space for the storage and maintenance of these materials and associated equipment needed to use the media).

Types of media described by the Carnegie Commission on Higher Education include printed work, film, multimedia classrooms, self-instruction units, language laboratories, audio-listening centers, individual learning laboratories, remote-access units, instructional use of radio, instructional television, broadcast television, cable television, videotape, videocassettes, computer-assisted instruction, and microfiche.

Electronic instructional technology can assist medical and dental school teachers and planners by making the learning environment effective and efficient. More extensive use of videotapes, telecommunication, computers, and monitoring is suggested.

Similar communications systems and data banks for patient care should be considered for home use. The future site of much health care delivery

may be the home, where parents communicate with the physicians at a distance. Educational modes, therefore, should be developed to train students to use electronic systems for solving health problems. Such systems might include a state or regional system with central patient records; TV cameras with telephone communication between physicians and patients; physician's aides working with patients at home or in a community center.

Voluntary coordination of facilities on state and regional levels should be increased. Coordination should be based on levels of care concepts and time availability criteria. Transportation and communication between facilities should be improved.

The location of professional training has definite impact on the distribution of health care delivery. As has been pointed out in other sections of this study, health professionals tend to remain where they are at the conclusion of their formal education or to return to places where they have lived previously.

Because of these implications, new health professions schools should be established in areas where there are shortages of health care delivery and where health professional education is not duplicated in other institutions.

In addition to full-time faculty and administration, health professions schools must utilize the services of volunteer or part-time faculty among the community's practitioners. It is important, therefore, that a new school be situated in a city where such professionals are easily available.

It is also essential that there be access to an institution capable of furnishing personnel, facilities, and established expertise in the basic health sciences necessary to produce a quality dental or medical program.

Because one of the greater single determinants in selecting a practice location is the final site of graduate study, clinical facilities should be

provided for graduate training in regions in the state which are underserved by the health professions.

Off-campus community service projects play another important role in the location of health professions education. Services such as storefront clinics, mobile clinics for both urban and rural areas, well-baby clinics, and mass vaccination programs, established and operated away from the institutional campus, will provide useful educational experiences for the students and will introduce future practitioners to geographical areas of need.

SELECTED INSTRUCTIONAL PROGRAMS

THE MEDICAL SCHOOL PROGRAM OF TEXAS TECH UNIVERSITY

Texas Tech University School of Medicine has had the rare opportunity to test out the concepts in its operational definitions in the establishment of a new health science institution. The school was created at a time when change was in the air. The Coordinating Board and the legislature were speaking in terms of Texas Tech University School of Medicine becoming an innovating school of excellence.

The medical school program at Texas Tech is not a finished and finely defined program, but one which is being formed. Those who initiated this program used partially original ideas, and partially modifications of ideas and programs being used elsewhere around the country in either pilot programs or in good ongoing programs. They combined these bits and pieces of programs and ideas into a coordinated, compatible, integrated whole, as an organizational scheme for their operation.

There are several purposes for the regionalization of health education. That form of program which is used by Texas Tech's medical school is the economical mobilization of existing resources. There is no reason to overbuild when there are institutions and facilities, manpower, equipment and patients in an area that, by an organized program, can be brought into a main stream of medical education. Unfortunately they do not always exist in one urban center. In an area like West Texas they are scattered over 125,000 square miles.

Another purpose or objective of regionalization is increasing the quality and quantity of health education. The distance between population centers in Texas makes it extremely difficulty for students to obtain or continue their health education if it is confined to one learning center.

A third purpose of regionalization is the retention of health manpower where needed. Professionals do not like to be isolated from the profession. It is hard to expect a physician to practice very long in a community fifty miles from his nearest colleague, if he has no opportunity to relate to continuing education and to his colleagues for an upgrading of his knowledge, so that it remains current. It has been found that the principal reason for physicians to leave rural areas is the professional isolation and their concern that they are falling behind in the art and science of medicine.

The educational organization for Texas Tech's program is made up of three main physical elements. The first is the hub or center of the medical educational program, the Texas Tech campus in Lubbock. There new educational concepts and ideas have been incorporated with traditional ones. One of these is that 50 percent of all student clinical exposure be in an ambulatory patient setting. Traditionally, some 90 percent of clinical exposure has been in a hospital setting. A former Texas Tech dormitory has been converted into an ambulatory teaching clinic. Despite the cost of renovation it was an economical measure of utilizing an existing structure. Moreover, it proved to be

a definite aid to the community since Lubbock has no county or charity hospitals, only private hospitals and practitioners. The medical school houses a regional emergency medical service, complete with a helipad. The school is able to serve the community and the region by providing a staff of faculty residents, physicians, and students while availing itself of excellent teaching material.

Texas Tech has chosen to use tutorial teams in an effort to keep medical educational more personalized and to help transfer ethics, value systems, and judgment, in addition to facts. In this program students actually have their own place in the school -- both in terms of location for study and as members of tutorial teams. A tutorial team is comprised of two mentors or team leaders and eight students. The team leaders are physicians, medical and basic science scholars who have a broad view of the health field and relate well to the students. This tutorial team uses a complex of three rooms: an office, with a secretary, giving support services for the leaders and team; and two study rooms with a freshman, sophomore, junior, and senior in each room. The students continually learn from each other and from their leaders. They can take a spot check exam to see how they are progressing in a course. They can interact, discuss, argue and develop a more personalized view of medicine than they would in a lecture hall.

The present medical school faculty consists of between 130 and 140 full-time people. This includes basic science, clinical science, and medical support science, such a biomedical engineering, health communication people, library science people, and medical illustrators. There is at present a part-time faculty of 300, outnumbering full-time faculty faculty by more than two to one. This medical school wants its students to be educated by people out in the field. It feels that good practitioners can be used to teach others, and education in the process can be strongly service and "real world" oriented.

While the main campus of Texas Tech is the hub or central core for the medical school, its program organization has other physical elements. The second is a clinical commuter campus. This means any area, surrounding the central campus in Lubbock, to which the students literally can commute. For example, a student in Lubbock can drive to Plainview, Littlefield, or Brownfield in the morning for surgery in a community hospital with a faculty member from Texas Tech or a part-time faculty member selected and appointed in that community hospital; drive back and be in laboratory or clinic on the campus in the afternoon. This clinical commuter campus, covering an area of about 45 miles vertically and 80 miles horizontally, becomes an out-reach area, expanding the concept of community involvement.

The third physical element of the Texas Tech medical school is satellite centers. These are areas where students move and spend anywhere from a few weeks to six or eight months. This experience takes place during the student's last year when his concentration is largely clinical. These satellites are: (1) the South Plains area with headquarters in Lubbock, (2) the Panhandle, with headquarters in Amarillo, (3) North Texas with headquarters in Wichita Falls, (4) West Central Texas with headquarters in Abilene, (5) the Concho Valley,

headquartered in San Angelo, (6) the Permian Basin, with the tri-cities of Odessa, Midland, and Big Spring, and (7) the Upper Rio Grande, headquartered at El Paso. Each of these cities functions as a city in itself, serving the educational needs for the area -- particularly in continuing education and allied health education.

These three physical elements of the program are joined by actual movement of individuals, telephone correspondence, and electronic transfer of information. The main campus has a television studio and an educational media department which produce tapes and develop programs for electronic transfer. All of the art and graphic work, photography, videotape presentations, and personal interactions, help keep a flow of information and ideas among the elements of this educational organization -- the Texas Tech campus, the clinical commuter campus, and the satellite centers.

The medical school curriculum is highly flexible. First of all, the program is a trimester one. With students on a 36-month curriculum, only three classes of students are in school at any one time. Students may opt for a four or a five-year program or may choose to finish four academic years in three calendar years. It is hoped that the curriculum may be adapted to teaching by objective; that is, adjusting the time for a student to complete a course based on how long it takes him to obtain stated objectives. It may be six weeks to two semesters.

Students are oriented into clinical medicine in their freshman and sophomore years at Texas Tech. The clinic program is wedge-shaped, with clinical experience increasing from the freshman to the senior year. Basic science is heaviest in the freshman year, decreasing to the senior year, where it is available through interdisciplinary teaching. Electives are encouraged only as special interest areas, not as the start of specialization.

THE UNIVERSITY OF TEXAS DENTAL BRANCH [8]

I. Overview of the Instructional Program

Since the early sixties, The University of Texas Dental Branch (UTDB) at Houston has been teaching "topics" instead of traditional courses. That is to say, rather than presenting curriculum content in discrete and often repetitious courses, the faculty served on interdepartmental teams and organized the dental curriculum into unified, integrated patterns and re-sequenced the content so that it would be more advantageously presented according to the student's needs. Eight broad topic areas of instruction (e.g., Cell and Tissue, Developmental Biology, Prevention, Medical and Surgical Therapy, etc.) were identified by 27 teaching departments to serve as vehicles for the interdisciplinary presentation of subject matter. Topic-integrated teaching is meeting the needs of each department and removes the necessity for the student to learn three or four different and perhaps conflicting concepts as well as eliminate the necessity for the student to learn the same concept on three or four different occasions. A core curriculum has resulted which can be finished by the end of the third year; thus, the fourth year didactics, to a major extent, are either elective or supplemental in nature. One of the inherent advantages of this curriculum model is the designed synthesis of the basic science, applied science and clinical knowledge.

The topic-integrated curriculum has been completely defined in terms of specific learning objectives. Therefore, students can proceed through the self-instructional materials on somewhat of an independent basis, seeking out the appropriate faculty members (listed in self-instructional program) when they need clarification or desire further elaboration on concepts presented in the program. However, scheduled lectures, seminars, and clinical demonstrations still lock the students into a structured time format.

In the early part of 1971, efforts were begun to convert the lock-step integrated topic teaching program to a self-directed modular system that would permit students to progress at their own rate and ability. Eight additional students were admitted in the 1971 freshman class specifically to participate in a pilot modular system of self-directed topic teaching. The eight did not attend scheduled lectures, but rather followed the self-directed modules prepared by the faculty. These modules included specific instructional content and behavioral objectives and were sequenced like the scheduled program. Following their first year in this self-directed program, these eight, plus the top student and an average student from the one hundred in the scheduled curriculum, made up a student panel to review with the Topic Teaching Committee the first year dental curriculum modules for possible modifications. These recycled modules are currently being field tested by a group of 24 students who entered the pilot program in September, 1972. After analysis of the results of the field tests is completed, a decision will be made concerning the self-instruction method for all 124 first year entering students. As they

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[8] The University of Florida, "Faculty Roles Contract," pp. 38-41.

continue to proceed on a self-study basis, the original eight students will be a constant factor in modular revision and development. Each successive June the student panel will meet with the Topic Teaching Faculty to review and redesign their previous year of study.

II. Faculty Roles Within the Learning Process

In many respects, the faculty roles within the scheduled topic teaching curriculum closely conform to those found in most traditional dental curriculum settings, That is, aside from research and clinical activities, much of their time in the instructional process is allotted to preparing and delivering group lectures, conducting seminars and demonstrations, testing students, and grading students.

Curriculum planning and development is a faculty role that is presently being emphasized at UTDB. All full-time faculty are assigned by department chairmen to represent that department on one or more Topic Committees. The function of the Topic Committee is to structure the content for their particular area of interest. In addition to organizing the course material, the faculty works closely with the Teaching Committee, Curriculum Coordinating Committee and the Instructional Development Services in generating behavioral objectives for the instructional modules and developing self-instructional material and evaluation instruments.

The 24 first year and eight second year students working in the pilot modular program do tend to remain socially apart from the students in the conventional curriculum since they do not share classes or physical facilities. Faculty interaction is unstructured and informal. The students self-direct their progress through the modules at their own rate, seeking faculty assistance according to their individual needs. When a student is ready to be evaluated on the modular content, he submits a "Self-Directed Examination Request Form" to the faculty member(s) serving as Topic Teaching Examiners. The form requires identification of what phase, topic, and module he wishes to be tested on and what date. The examiner returns the request form to the student describing the examination format (written, objective, oral, or pratical) and other comments which would assist the student in preparation for the test session. The Curriculum Coordinator closely monitors the students' progress and frequently assumes the role of a faculty advisor.

III. Reactions to the Learning Process

Faculty

The investigators had conferences with the members of the Topic Teaching Committee and Curriculum Coordinating Committee. From UTDB the discussions mainly centered over the historical development and organization of the Topic Teaching curriculum, as well as over the issue of student and curriculum evaluation as this was an area of much concern and interest to the UTDB faculty. The discussions provided an opportunity to explain faculty roles in an individualized program but did not produce direct observation of faculty roles.

This is quite understandable since at that time UTDB at Houston had been limited to the eight pilot students and most of this interaction involved only a few of the faculty members. In essence, they are just developing the self-instructional topic teaching approach to learning and, like the University of Florida's College of Dentistry, are seeking to identify what the faculty roles and responsibilities will be when operating within an individualized learning environment.

Students

The authors interviewed the eight pilot students as a group. Their physical closeness has resulted in a very cohesive and cooperative group of dental students. The pilot students work closely together on their self-instructional modules. Mutual tutoring is commonly practiced when difficulties are encountered. Whenever a problem arises that the students cannot resolve, one of the students is generally designated as the group spokesman to seek out the solution from the appropriate faculty member(s) and once an explanation is obtained, inform his peers. The responsibility for learning rests with the student and the student reactions indicated they "enjoyed" that responsibility.

The students' reactions to the modular system were definitely favorable. They particularly enjoyed the opportunity to pace their own progress and also noted the use of behavioral objectives as being facilitative to their learning. Some of the recommendations which they offered for improving the system included:

a) The students feel their role in the pilot modular system is of a developmental nature rather than experimental. Nonetheless, certain faculty appear to lack awareness on this point and interact with them as if they were subjects of an experiment. This sometimes results in faculty remaining somewhat distant in any attempts to relate to the students. There was some concern about whether they were being paid equal attention in comparison to the scheduled students.

b) It was recommended that the behavioral objectives included in the modules be more uniformly constructed in terms of clarity and specificity. Some of the students noted that behavioral objectives listed in one module may be clear and precise and easy to understand while in another module objectives may be vague and open to many interpretations. They also expressed concern that when evaluated on their achievement of objectives, some test items seemed to be quite removed from the objectives they were responsible for.

Administration

The discussion with administrative personnel was primarily with the Curriculum Coordinator and the Director of Instructional Development Services. These two individuals are largely responsible for assisting the faculty in

developing and implementing their self-instructional modules. Both individuals work as much as possible on a one-to-one basis with the faculty in offering constructive suggestions related to instructional development. In addition, annual faculty work shops are held which frequently provide an opportunity to discuss and investigate critical issues related to the dental curriculum.

Occasionally the accumulation of daily frustrations, accompanied by a sudden influx of questions on modular development procedures, and a general need for a rallying of the troops, necessitates the administration and faculty packing off to some isolated location in Texas and, severing all communication with the outside world for a few days, to attempt to "get it together again." These retreats allow the faculty member to focus his undivided attention upon his modular instructional programs, as well as associate in a close relationship with his colleagues while reviewing the academic year, exchanging philosophies and concerns, and recommending future changes. The faculty has reacted very enthusiastically to these retreats with the majority returning to UTDB with a rejuvenated modular outlook and manifesting a stronger esprit de corps.

The suggestion was made that an effective aid in training faculty might be to identify those members of the faculty who are respected in their disciplines and have a strong grasp of the philosophy, concepts, and mechanics of the new system and encourage them to "tutor" their colleagues who may be having difficulty in acclimating to a modular program. Because he is a respected member of their peer group, the faculty will often listen more closely to this individual than to an outside consultant.

OHIO STATE UNIVERSITY COLLEGE OF MEDICINE

I. Overview of the Instructional Program

The Independent Study Program (ISP) permits the student to progress at his own rate through the pre-clerkship portion of the medical curriculum.[9] It is designed around body systems and consists of three segments: "Normal man," "Introduction to Pathophysiology and Therapeutics," and "Pathophysiology of Man." The program is organized into modules, each of which contains the following elements: instructional objectives, selected references (e.g., book journal, articles, films, slides, tapes), computer-assisted self-evaluation exercises, and faculty members.

The majority of the student's learning activities are centered around the "Learning Laboratory" and the "Instructional Material Library." In simplest terms, the former houses the instructional hardware (study carrel, projectors, tape recorders, computer terminals, etc.) and provides a central study area. The latter provides a secure storage area for the instructional software (printed articles, movies, slide programs, video tapes, audio tapes, etc.). In the learning lab the student interacts with the instructional resources in accordance with his individual needs. Generally, the student is viewing movies and slide tape programs, dialing up video tape presentations, taking TES exercises on the terminals, engaging in small group discussions, etc.; much of his reading assignments is commonly done outside the lab area (approximately 80 percent of the instructional material for the independent study program is in printed form).

On a typical day, a student is free to manage his own time as he chooses. However, one or two days a week, there are scheduled activities (average 3-6 hours per week) such as physical diagnosis, special topics seminars, emergency care sessions, and periodic laboratory demonstrations. When a student is satisfied that he has learned the material which was specified in the objectives for the module, he goes to a computer terminal to take a computer-assisted self-evaluation exercise, which has been designed by the faculty for that module. Each time the student completes a self-evaluation exercise on the terminal, he is asked to bring his printout to the faculty member(s) responsible for that particular test. At this time, the faculty member will sit down with the student and go over any trouble spots the student has encountered. Following the conference the student returns to the module for additional review or proceeds to the next module.

Computer-generated student monitoring reports are provided for the faculty each week. These weekly reports indicate the student's progress in the curriculum, the student's activity on the terminal during that week. At any time, up-to-the-minute student status reports may be obtained at the computer terminal by any faculty member.

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[9]The "regular" Ohio State Medical curriculum is a four-phase, three-year (3.5 months) curriculum; and the ISP is comparable to the first three phases (15 months) of that curriculum.

II. Faculty Roles Within the Learning Process

". . . one of the distinct advantages and strengths of the program is the availability of faculty to students for assistance in their study. In addition to serving in a tutorial role, each faculty member is designated as the advisor of one or more students throughout their enrollment . . ." 10

". . . At any time in his studies, a student may seek consultation with a faculty member. Since they have no responsibility in the Independent Study Program for preparing and delivering lectures, the faculty spend most of their student contact time in individual conferences." "Students spend an average of 3 to 3 1/2 hours per week with faculty members primarily in individual tutorial conferences and small groups." 11

The major points of contact that the faculty have with the students during the 15-month Independent Study Program are in the following settings:

Advisor

Each faculty member is an advisor to one or more students. His role as an advisor is best labeled as being a "father figure." Although his responsibilities mainly focus upon assisting the student with his academic program and consulting with the student on academic problems, many of the faculty will offer an empathetic ear and referral suggestions when confronted with a student's personal problems.

Tutor

Each faculty member is responsible for assisting the students for the content he provided in the modules and for the self-evaluation tests he developed. The faculty member provides time for informal student conferences as much as possible each day (estimate two hours per day). These daily tutorial sessions offer the students an opportunity to get immediate clarification on particular concepts which they encountered in the module.

Discussion Leader

Many of the faculty members are involved in small group seminars or discussion sessions. The two major group sessions are: (1) Clinical Correlation Sessions and (2) Student Seminars.

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[10] J. Griesen, R. Geran, R. Folk, and J. Prior, "A Pilot Program of Independent Study in Medical Education," paper presented at the 5th Rochester Conference on Self-Instruction in Medical Education, April, 1971.

[11] Excerpted from a memo written by the Assistant Dean for the 1972 incoming first-year students.

1. Clinical Correlation Session - the entire class is assigned to laboratory groups with approximately sixteen students in each group. Approximately once every two weeks a lab group will be given an oral examination by the faculty. During these sessions questions are asked that are designed to stimulate the students to higher-order levels of thinking and not to formally evaluate them. The purposes of these faculty managed sessions are: (1) give students an opportunity to bounce questions and ideas off one another and the faculty discussion leaders; (2) help students synthesize the facts and concepts they acquired over the previous weeks; and (3) prepare students to become more effective at orally presenting the information.

2. Student Seminars - periodically, the students will initiate an open seminar which usually centers upon a current topic or issue such as abortion or, perhaps, medical insurance. The students are responsible for initiating and conducting these seminars and making the presentations. The faculty is invited to participate in the seminar. Usually there are one or two faculty members who are consulted as resource persons for the seminar; these individuals usually always attend.

Lecturing

Those faculty members who are responsible for the "anatomical prosection" or the "physical diagnosis" sessions, conduct a minilecture about once every two weeks.

Evaluator

The faculty's role in the student evaluation process is primarily to generate valid test items for the self-evaluation computer programs and for the six to seven comprehensive tests that occur during the 15-month curriculum. When reviewing a student's test printout, the faculty member attempts to diagnose deficiencies in the student's understanding of the instructional content, prescribe appropriate remedial learning activities, and judge if the student has reached the desired level of competency.

Instructional Developer

In addition to the aforementioned roles of the faculty when interacting with students, each faculty member is continually involved in developing and revising instructional lessons or packages for the modules. As described by one of the faculty, media development has been somewhat of a "backroom operation." With the assistance of a part-time photographer and borrowed equipment, the faculty do their own photographing and tape narrations resulting in "quick and dirty" slide tape instructional programs.

III. Reactions to the Learning Process

Faculty

The investigators conducted individual interviews with four faculty members involved in the ISP. Excerpts of their more significant comments and observations on the curriculum and the learning process are summarized below.

1. The tendency is for the students to go off on their own to study initiating contact with the faculty only when they had a particular question (if then). Thus, student contact was sometimes difficult to initiate, especially in terms of informal social interaction.

2. The removal of "communication threat" which is operationally defined as the students not interacting with faculty because of the penalties that might result from their displaying inaccurate or inappropriate knowledge. The ISP provides an environment where the students and faculty can interact individually or in smaller groups where they can interact and minimize the "communication threat."

3. Instructors must not equate lectures and tutoring. They must identify the student's level of thinking and talk with him, not at him.

4. Initially, the faculty advisors monitor the student's progress very closely. However, as the student becomes more confident and more able in operating within the ISP the need for close observation of the student has been found to decrease. Initially, the faculty and student get together at least once a week. In most cases, after a couple of months in the program, this has tapered off to advisor/student contact approximately once a month.

5. Curriculum development is still considered secondary to research and clinical service activities. The general opinion conveyed was that the primary requirement is for stronger administrative support for teaching, that is, stronger recognition that teaching activities are just as important as research.

Students

What follows are the highlights of a discussion between investigators and three experienced ISP students.

1. The students were pleased with the quality of instruction they were receiving and felt that the learning format was effective, although they had to work harder and become more disciplined than the students in the traditional curriculum.

2. The students reported that the longer they were enrolled in the ISP, the more the competition among themselves dissipated. Nonetheless, they generally felt that the sense of competition, although lessened, would never be completely eliminated.

3. There was particular concern as to where they were in respect to those students in the traditional curriculum. Were they measuring up? Were they getting the same quantity and quality of material as the traditional students?

4. Additional comprehensive post-tests should be incorporated into the curriculum. They reported that one after three or four modules was not enough.

5. More faculty contact is needed and a closer physical proximity between faculty offices and student learning areas was desired.

6. Students interact with faculty after being exposed to the instructional material. There is a certain reluctance to see a faculty member before studying the material because the students could not contribute in the conversation.

7. The students reported the Clinical Correlation sessions were good sources for student-faculty contact and provided the student with a valuable opportunity to apply the newly attained concepts. Successful conferences should be nonthreatening with an informal atmosphere.

8. The faculty advisors should be volunteers, and some method of matching between faculty and students should be conducted.

9. The students offered the recommendation that an advanced ISP student should be assigned to new students to assist in orientation to the program and to offer the student tutorial assistance if needed.

Administration

Two faculty members who occupied administration positions within the ISP offered the following comments regarding faculty roles.

1. Faculty recruitment for the Independent Study Program is conducted pretty much on a "gut level" basis. The applicant should have the necessary academic and professional prerequisites and possess particular attitudes and abilities. Specifically, those attitudes which are considered essential, or at least valuable, are as follows:

a) general interest and enthusiasm toward teaching
b) desire to be experimental and innovative
c) flexible, not threatened by an unstructured format
d) has lost confidence in the traditional dogmatic method
e) does not feel that he must have all of the answers all of the time
f) does not regard information with a sense of ownership or personal domain

Three other characteristics which are regarded as being desirable are: (a) that the new faculty member should have the ability to carry on many activities simultaneously; (b) that he has a broad, general background in

the basic sciences, rather than come in as a "narrow sighted" specialist. Experience has indicated that clinicians are more difficult to involve in curriculum development when compared to the participation of basic science faculty; and finally, (c) that he has the ability to talk with students, not at them.

2. Faculty training is broadly labeled as an "apprentice system." That is, the new faculty member is assigned to a senior faculty member within his particular discipline and this senior member offers "on-the-job" training. Since few of the faculty have any significant background in educational technology or individualized instruction, educational support is most commonly provided from the following two resources:

a) The Office of Medical Education is available daily to meet with new faculty members on a 1:1 basis or in small groups and provide information and/or technical assistance.

b) Periodic retreat seminars or workshops are conducted in which representatives from the Office of Medical Education and/or other consultants would discuss topics and issues relevant to an individualized curriculum. It is estimated that the "seasoning process" for new faculty is 2-4 months, after which he has usually mastered the basic terminology and concepts related to ISP.

3. The advisor-student and tutor-student encounters follow for the most part an "open-door" policy. That is, students are urged to seek out the needed faculty member and to stop by his office at any time. If the faculty member is not available at the given moment, then the faculty member sets up an appointment for a conference at the earliest possible time. Experience has shown that some of the students are reticent in seeking out the faculty, especially in the beginning months of the program. Therefore, the weekly student progress reports generated by the computer are frequently used by the faculty to help identify students who may be falling too far behind. The student's advisor will, in this case, initiate a conference with the student as soon as possible.

4. Faculty members are encouraged to spend as much time as possible interacting with the students in the Learning Laboratory. For the most part, success in this endeavor has been quite minimal. The major handicap in getting the faculty into the Learning Laboratory is the lack of proximity between their offices and the study area. It was also observed that an added hindrance to getting clinical faculty more exposed in the Learning Lab is that they were frequently unavailable because of clinical responsibilities.

5. The availability of technical support personnel to assist the faculty in development of instructional programs will change the faculty's role. Instead of writing and "shooting" his lesson scripts, he will retain the major role in the former but will relinquish his production responsibilities to the technical support personnel.

UNIVERSITY OF MARYLAND COLLEGE OF DENTISTRY

I. Overview of the Instructional Program

Within an ongoing lock-step curriculum format, newly devised instructional media are playing an increasing role in the area of instruction. Most departments within the dental college have created a variety of self-instructional materials. And two or three departments already have most of their course material in individualized instructional units.

Scheduled lectures and lab demonstration are still very prevalent as teaching methodologies. However, approximately one-third of the student's time has been free to allow him to work with self-instructional materials in the Independent Learning Center (ILC). The Center provides an environment for independent study with self-instructional material in a variety of media to allow the students to cover the information conventionally included in the curriculum's courses. Since the majority of the curriculum's instructional content is covered in lecture and in lab sessions, much of the self-instruction is used to support and supplement the traditional curriculum.

Although facilities for independent study are found throughout the school, the primary source is found in the Independent Learning Center. In this area 50 carrels are provided for use of self-instructional media. Most of the carrels are equipped for 8 mm films, synchronized slide/tape programs, audio tapes, and programmed manuals. Some of the carrels are not equipped with hardware, thereby enabling students to have a clear area for studying printed materials. As the student enters the ILC, he checks out a desired program from the full-time clerk in charge of the instructional material library. He then selects a carrel and proceeds to perform the learning activities required in the program. The ILC is available to the student for approximately 12 hours each day and, additionally, the students are permitted the check out any of the self-instructional material for use at night, over weekends, or during vacations.

A significant amount of the students' learning time is also spent in the multi-disciplinary laboratories. All of the labs are equipped with self-instructional materials and multimedia equipment. From the television studio live or videotaped programs are transmitted to approximately 100 monitors located in each of the 16 multi-disciplinary labs. While a demonstration is being observed by television, students are performing the prescribed operations. Those faculty members who are responsible for the instructional content area are asked to be present in the M-D labs during the televised presentations and to circulate among the students and offer assistance when needed. Each student is provided with a laboratory information sheet which must be initialed and dated by the faculty member as each project is completed.

The lecture rooms are also equipped with monitors located for easy visibility to all students. Talk-back systems have been incorporated so that dialogue may be carried on between the professor in the studio and students in any of the receiving stations.

II. Faculty Roles Within the Learning Process

Faculty roles, in the implementation of instruction, vary somewhat from department to department, depending on the degree of individualized instruction that has been developed by each discipline. In disciplines where self-instruction has not been fully developed the majority of the faculty's time is allocated to preparing and delivering lectures and conducting lab demonstrations; while in the more "individualized" departments the faculty devotes more time conferring individually with students or preparing additional study materials.

All faculty members are involved, in some degree, in developing self-instructional materials. As a matter of fact, the faculty has produced more than 300 self-instructional programs. The faculty member's role in the development of learning resources usually involves frequent meetings with his team members and the Director of the ILC (educational consultant) for discussion of instructional goals and objectives, proper instructional methodology, and assigning duties and responsibilities. Fuether consultations are conducted with technical personnel (T.V. director, photographer, illustrator, etc.) for assistance in selecting the proper medium, organizing the material, and designing suitable visual aids.

Those faculty members who were responsible for developing instructional units for use in the M-D labs are required to be present in the lab area during the scheduled instructional presentations.

A few of the faculty have additional roles as advisors. Each department appoints one of its faculty members to serve as an academic counselor. His main responsibility is to assist students who appear to be making poor progress through the curriculum. Another faculty member devotes half of his time coordinating this academic counseling service. In the immediate future one of the dental faculty will be a full-time "facilitator of learning" and will coordinate the referring of students for remedial tutorial assistance.

III. Reactions to the Learning Process

Faculty

The faculty has reacted quite favorably to the concept of student independent learning. As expressed by one faculty member, "using objectives has made things easier." Even if the particular has not yet been individualized, the spelling out of specific student learning objectives facilitates the presentation of the material under the traditional lecture/lab format.

A few of the faculty members have expressed concern about students seeking help at inopportune times. The suggestion was made that perhaps this open-door policy should be replaced with more structured student-faculty office hours.

The hope was expressed that the Regents (governing body for the Dental College) will soon recognize instructional development as being equally important as teaching and research as an additional basis for promotion.

Students

Faculty members who were responsible for the instructional phase of a self-instructional laboratory course in Basic Dental Science conducted an evaluation survey of 128 sophomore students enrolled in the course.[12] One of the general conclusions drawn from the responses was that the students favor this form of instruction but a sizable number indicated that the utilization of laboratory demonstrations in conjunction with self-instruction would be preferable. In terms of student evaluations of the instructors, the number of favorable responses was greater than those unfavorable. Two examples of the areas of critical comment are:

"...some held back what could have been a more meaningful learning experience by just criticizing rather than assisting."

"There are a few that are very impatient and do not take realistic views of student products."

From the sample of students interviewed by the investigators, this favorable attitude toward self-instruction was confirmed. Some additional reactions elicited from the students were:

a) They would like to see those departments which are predominantly operating under the traditional instructional format become more individualized in their instruction.

b) In some of the courses the objectives are either too broad and/or ambiguous.

c) Sometimes the test questions do not correspond to the course objectives.

"A significant factor in the stimulation of faculty members to produce self-instructional materials has been the support by the administration of the School of Dentistry. The Dean has stated on many occasions that this activity is a scholarly activity on a par with research and classroom teaching and that a well balanced program of scholarly activity is an important criterion for promotion." [13]

Faculty members are responsible for developing their own self-instructional materials with support provided by the Division of Educational and Instructional Resources. In addition, five one-week workshops are held for the faculty during the summer. Faculty members attend on a voluntary basis to prepare additional self-instructional material for the coming year and/or revise material that has already been produced.

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[12] R. Gigliotti and E. F. Moreland, "Self-Instructional, Preclinical Fixed Partial Prosthodontics," Journal of Dental Education, (February, 1972) pp. 42-52.

[13] M. Lunin and E. F. Moreland, "Independent Learning Center in a Dental School," Journal of Dental Education, (May, 1972) pp. 20-23.

The traits identified by the administrators when recruiting faculty were as follows:

a) He agrees with the general philosophy of individualized learning.

b) He does not feel that he is indispensable as an information source.

c) He is imaginative, creative and willing to experiment.

d) He thinks logically and can communicate information in a logical sequence.

e) He is flexible in his approach to student instruction.

f) He is able to communicate with students and present instructional information at their level.

In conclusion, one administrator expressed his general reaction to the present status of the learning process at the College of Dentistry in the following manner:

> "We are presently involved with independent learning, not yet with individualized instruction."

CENTRAL NEBRASKA TECHNICAL COLLEGE

I. Overview of the Instructional Program

From its very beginning in 1966, Central Nebraska Technical College (CNTC) in Hastings has operated under a system of individualized instruction. In accordance with their philosophy of individualized instruction, a student may enter a training program any day the college is in session and proceed through the program at his own learning rate. Credit is given for work completed without regard to the time involved. Automotive technology, electronics, agriculture, construction, business and office work, dental technology and nursing, are examples of areas of occupational training using individualized instruction to prepare for technical careers. There are more than 3,500 day and evening students currently enrolled at CNTC.

The traditional classroom is not found at CNTC; instead, study centers, equipped with necessary multimedia equipment and reference materials, are located in each of the occupational training areas. These centers commonly include student study carrels furnished with 8mm film projectors, slide projectors, and tape recorders. Every effort is made to create an optimal learning environment within the study center. All instructional "software" such as 8mm film cartridges, slides, audio tapes, printed materials, etc., are in immediate proximity to the carrels. Thus, the student can conveniently interact with the films, tapes, and printed matter as many times as necessary to gain the information for course mastery. Furthermore, the study areas are well lighted and, whenever practical, floors and walls are covered with acoustical carpeting; acoustical screens are also scattered about the areas to cut down reflected noise. The college's student-operated FM radio station continuously pipes soothing music into all rooms and offices throughout the college, including the study centers.

The individualized instructional process at CNTC revolves around the student's use of a study guide, information sheets, work sheets, project sheets, and inventory sheets. All of these are directly accessible in each study area. The study guide is literally the "road map" through the learning process. It lists step by step the specific activities the student must perform while proceeding through the course. This might include viewing films, reading sections in textbooks, listening to tapes, obtaining and completing project sheets, etc. In the student's early courses the directions are quite detailed and specific; however, as he becomes more accustomed to learning on his own, the directions become less detailed and allow for more judgment. The information sheets are compilations from various resources and are used to present relevant information in print form. Occasionally these sheets are assembled into information "manuals" which contain pictures, graphs, and narrative. As the student proceeds through the course he will frequently make use of work sheets to record information. Some students use these sheets for a "note taking" process, some to record data for later use, and others to record data as an experiment progresses. In essence, these sheets encourage the student to become active in his learning and also provide the student with a convenient study outline for later review. Project sheets represent

the "do it" phase of learning at CNTC. The project sheets are viewed as a vital part of the learning process. Each project is written in behavioral objectives which explicitly inform the student the specific task he is to do, the conditions and parameters under which the project must be completed, and the criteria by which his performance will be evaluated. Detailed procedures, such as might be found in a manufacturer's manual, are given for completing the project. The student is not given grades on projects completed in occupational areas; instead, evaluation is made by performance levels. The student is expected to perform at a given level that relates to the requirements of prospective employers. Finally, the inventory sheets are used as self-testing exercise which require the student to recall information in order to successfully complete the form. Some instructors make use of this sheet as a check list for an oral evaluation of the student's mastery of the material.

Anytime the student feels ready to be evaluated on his mastery of a particular course, he makes arrangements with the course instructor for a post-test session. When the student successfully exhibits mastery, a course card is filled out and signed by the instructor and stamped with the student's identification card. Each week a computer printout is generated for the administration and faculty and describes the weekly student progress. Monthly summaries are also made available.

In this individualized approach to learning, any experience the student has in his chosen area of training can be helpful in accelerating his progress. It is even possible for the student to "test through" any course if he has the needed background.

II. Faculty Roles Within the Learning Process

"The teacher in the individualized system here works more as a manager of an educational program than as a disseminator of information."[14] All faculty members have scheduled "classes" and are required to be present (as are the students). But, instead of lecturing, they station themselves at desks in the study areas and monitor the students' learning; many of the instructors work together in managerial teams. As managers of the instructional process, the instructors are readily available to answer student questions, clarify or elaborate on instructional material, assist with projects, and perform evaluations of each student's progress.

Approximately 30-40 percent of the instructor's 40-hour work week is devoted to instructional development activities. The faculty member usually commences the instructional development process with "advisory committee" meetings to develop the educational goals. The advisory committee consists of outside individuals who are working in the particular instructor's vocational area. The assumption is that they are most able to assess the present needs of that vocational field. Once the basic goals are agreed upon, the

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[14]Central Nebraska Technical College Visitor Information booklet issued by the College Relations Director, p. 2.

instructor will begin to generate the specific learning objectives and develop the instructional content along with a study guide, work, project, and inventory sheets, etc. Practically every instructor has had actual experience in the field being taught; that is, an individual developing an instructional program on welding techniques will have held a job as a welder. Nonetheless, consultation sessions are often held with the Dean of Instruction, who, serving as an instructional design specialist, will assist the faculty member in constructing his instructional objectives and planning his instructional program so that it touches upon as many of the student's senses as possible.

Most of the instructional films and tapes are prepared by the instructors themselves. The instructional medium that has received most emphasis in production is the technicolor 8mm film loop. These four-minute "single concept" films are packaged in a plastic cartridge which inserts easily into a small projector. The films are viewed in conjunction with cassette audiotapes which provide the narration. Topics covered in these tapes and films range from secretarial skills to denture construction. The faculty has access to technical advice and assistance from the Supervisor of Instructional Resources and his staff as well as the use of two completely equipped recording studios and a photography room. An on-campus print shop is also available for producing their "information sheets."

Every faculty member serves as a faculty advisory to a number of students. Students are assigned an advisor on the basis of his educational or technical program. The primary role of the advisor is to assist the student in the planning of his program and to advise the student on academic problems that he may encounter during the pursuit of his studies.

III. Reactions to the Learning Process

Faculty

If the sample of faculty interviewed was responding very positively to the individualized approach to student learning, it was reported by some that they did not realize until they got into the program what a tremendous task it is to construct their own instructional materials. On the other hand, these same faculty members felt that the development of new materials was one of the more rewarding experiences they had encountered in education.

One of those interviewed had been a former student at CNTC. She found that her experience as a student in the individualized program provided added insights when developing her materials. Specifically, when writing the study guide, she tried to include the detailed information the student would need to complete each learning task (e.g., if a student is to read a chapter in a text or use a specific tool -- where he may obtain it). The purpose of the study guide is defeated if the student has to constantly contact the instructor for this information; its intent is to allow the student to be an autonomous learner. She also tried to make her learning objectives as precise as possible and her tests closely correlated to these objectives.

Students

The students voiced much enthusiasm toward the instructional process. They especially enjoyed the opportunity to work at their own rate which allowed them to drop-out and work for a while if necessary. When they returned to classes they could pick up where they had left off (provided their absence had not been unreasonably lengthy in which case some remedial work might be required). The students also liked the close personal contact and easy accessibility to the instructors that this system afforded.

Administration

The Dean of Instruction at CNTC stressed that each concept which the student is to learn is presented to as many of the student's senses as possible. Some of the major teaching methodologies employed are the visual (printed material), the auditory (audio tapes), visual and auditory (film loops, slide tape and video tape programs), and the tactile (live models and machinery). If the student does not grasp a concept through one medium, he is given additional learning opportunities via the other media.

In regard to faculty recruitment and training, the Dean of Instruction observed that prospective faculty members must be "people oriented" to operate successfully in this instructional program. Emphasis has shifted from assessing an instructor's academic background to assessing his interest in working with students and his ability to establish an emphathetic working relationship with students. Unfortunately, these attitudinal assessment procedures consist primarily of one's subjective feelings when interviewing the applicant, in addition to attempting to infer interpersonal behavioral patterns when reviewing his past work record.

During the first two years of the college's existence, formal workshops on individualizing instruction were conducted for the faculty. Since then faculty turnover has been minimal. Thus the few new faculty who enter each year have been given on-the-job instruction by the Dean of Instruction and his departmental colleagues. Instead of immediately "bombarding" the new faculty member with volumes of information about individualized instruction and possibly discouraging or, perhaps, even turning off his initial enthusiasm toward this instructional system, the general approach is to closely observe his maturation within the instructional process and tutor him on the concepts and mechanics of the program when he begins to "signal" that he has a need for and desires the necessary information.

PURDUE UNIVERSITY

I. Overview of the Instructional Program

At Purdue University University the authors visited the introductory Botany and Zoology courses being taught via audio-tutorial units called "minicourses." This minicourse approach is based upon the audio-tutorial method of instruction originally developed and used at Purdue by S.N. Postlethwait.[15] A minicourse is a self-contained instructional package dealing with a given principle or concept and commonly incorporates learning objectives, a programmed audio tape, printed study guides, visual aids, and actual biological materials. The length of minicourses may vary from one-half hour to two hours. During this learning time the student is directed to a wide variety of activities including: listening to audio tapes, reading articles, examining diagrams, studying demonstration materials, viewing films, handling biological specimans, and conducting experiments.

Most of the student's learning takes place in Independent Study Sessions (ISS) at the Botany or Zoology Learning Centers. Anytime between 7:30 a.m. and 10:30 p.m., Monday through Friday, the student can enter the Learning Center and obtain a study guide for the particular minicourse he plans to work on. This guide states the rationale for the minicourse, lists the behavioral objectives, and provides exercise sheets for the student to complete as he proceeds through the audio tape. If an audio-tutorial booth (study carrel) assigned to this minicourse is vacant, he may check in this booth and begin the minicourse. Every study booth is furnished with the appropriate audio tape and all other instructional materials needed to complete the minicourse. Materials too bulky or too expensive to include in every booth, as well as laboratory experiments and biological specimens, are "set up" on central tables for common use by all students.

Minicourses are set up in the audio-tutorial booths during specific weeks of the semester. The number of booths prepared for a given minicourse is determined by the estimate of the length of time required for completing that minicourse and the number of students enrolled in the course. The student is given a schedule of the sequence and quizzing dates. Booths and demonstration tables are changed over the weekend; however, during a given week, the Learning Center contains at least one booth for each minicourse offered the preceding week.

The senior instructor usually schedules a one-hour General Assembly Session (GAS) once a week. Attendance is voluntary. However, students are urged to attend because those concepts which have been identified by the teaching assistants as presenting some difficulty in the Learning Center that week are commonly expounded upon. In addition to clarifying instructional content, the senior instructor uses this assembly to stimulate the student's

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[15] S.N. Postlethwait, et al. The Audio-Tutorial Approach to Learning, (2nd ed.; Minneapolis: Burgess Publishing Co., 1969).

motivation to learn by presenting guest lecturers and showing special films.

A student signs up for a written quiz session when he is ready to demonstrate mastery of a minicourse. Each student records his answers to the objective-type questions on an IBM sheet and then gives the completed form to a teaching assistant who, with the aid of a key, immediately informs the student whether he reached mastery (he is usually allowed one error). If the student fails to achieve the level of mastery required for that minicourse, those course objectives he did not pass are identified for him and he is asked to go back and review the content related to these objectives. The student must demonstrate his level of preparation to a teaching assistant on duty in the Learning Center and an oral quiz before a permission slip to take a written quiz for the second time is issued. If the student again fails to achieve mastery, he must schedule himself for a special tutorial session with a teaching assistant and demonstrate a high level of preparation before a permission slip will be issued for a third attempt. At periodic intervals pretest sessions are scheduled to give students an opportunity to "test through" as many of the minicourses as their background permits.

Each minicourse is assigned a unit value based on the estimated learning time required by the average student. When a student has successfully completed all of the required minicourses for the course in which he is enrolled, he has earned a grade of C. He may earn an A or B by accumulating additional units or points. These extra points may be earned by completing elective minicourses, reading and writing summaries on assigned articles, or taking one or all of three higher-level examinations. The exams consist of essay-type questions designed to make the student synthesize information and apply principles and concepts learned in the minicourses.

II. Faculty Roles Within the Learning Process

There is one senior faculty member responsible for both the freshman Botany and Zoology programs. Since several hundred students are enrolled in each of these courses, graduate students commonly serve as teaching assistants. The four major responsibilities assigned to the graduate teaching assistants on a rotating basis are:

1) Set up the audio-tutorial booths and demonstration tables for the minicourses scheduled for the coming week.

2) Station oneself in the Learning Center to answer students' questions on the instructional material and assist them in using the instructional apparatus.

3) Administer oral quizzes for assessing a student's level of preparation and written quizzes and examinations for assessing a student's level of mastery.

4) Tutor in special sessions those students who are having particular difficulty in mastering the material. (In an attempt to alleviate some of this work overload, undergraduate students who are doing satisfactory work in the program are encouraged to volunteer as tutorial assistants and earn extra grade points.)

The work activities of the teaching assistants permit the senior instructor to operate as a manager of the instructional process and as a learning resource person. In his managerial role, he receives weekly computer printouts of the students' minicourse test performances. This serves as a mechanism for identifying students who are progressing unsatisfactorily. Through consultations with his teaching assistants and the student himself, the instructor attempts to diagnose the learning difficulties and recommend appropriate remedial measures. The General Assembly Session offers the main arena for implementing his role as a learning resource person. It is here that he presents supplemental information in the form of guest speakers, films, or his own lectures and demonstrations to enrich and, perhaps, clarify the students' experiences in the Independent Study Sessions. Of course, he also operates as an additional resource when he is frequently consulting with students on an individual basis. Students are always invited to drop by the senior instructor's office any time they wish to discuss an academic problem or talk about a particular item of interest.

A significant amount of the senior instructor's time is allotted to the developing and revising of audio-tutorial tapes. In constructing an A-T tape, the instructor assembles all the instructional items required for a minicourse (specimens, models, printed materials, slides, etc.) and records the conversation he would expect to use when personally tutoring the student through a sequence of learning activities.

III. Reactions to the Learning Process

Faculty

The author talked with the senior instructor and three graduate teaching assistants who were stationed in the Learning Center. Their comments regarding the audio-tutorial program included:

1) A lack of funds for hiring additional graduate students coupled with a high student enrollment in Botany and Zoology has created a very heavy work load on the teaching assistants. Furthermore, a strain on the learning facilities and equipment is being experienced. Much logistical planning in scheduling the A-T booths for specific minicourses is required in order to avoid "bottle-necking."

2) The students as a whole are working above and beyond their basic requirements. The Learning Center housing the elective courses is consistently "packed." Student suggestions for elective topics they would like to see developed into minicourses are constantly being solicited.

3) Student preference favors more minicourses of shorter duration. Thus, many of the old minicourses which required an estimated two hours learning time have been broken down into two one-hour minicourses.

4) It was noted that some students would try to "beat the system" by returning to retake the objective quizzes without reviewing, with hopes of hitting upon the correct answer combination. Also, some passing on of the correct answer key to later quiz takers was noted. To remedy this situation, a "pool" of test items has been developed for each minicourse objective. A computer randomly selects a test item from each pool and this printout is used for the initial quiz session. Different quiz printouts are generated for the make-up sessions. Furthermore, a student must now show

evidence of preparation to the teaching assistant before he is allowed to retake a quiz.

Students

The author informally talked with five students while they were taking a break in the Learning Center. All five unanimously endorsed the audio-tutorial approach to learning and remarked that the tapes were pleasantly informal, quite understandable, and generally enjoyable. One student felt that the audio-tutorial method required him to work harder and longer than would a traditional biology course, but the A-T method made his studies more personally relevant and interesting. None of the five students spoken to had previous experience with this method of individualized instruction; thus, they found the first week or two somewhat "scary and confusing." However, the ability to pace their own learning and the close accessibility of teaching assistants allowed them to quickly acclimate to this new system. The opportunity to direct their studies according to their biological interests was viewed quite positively by all five of these students.

Administration

The audio-tutorial approach to learning is presently limited to a few of the courses within the traditional curriculum at Purdue. The college administration was not interviewed, since they were not active within the individualized learning environment

COSTS AND FINANCIAL IMPLICATIONS
IN MEDICAL AND DENTAL EDUCATION

STUDY SUBCOMMITTEES ON COSTS AND FINANCIAL IMPLICATIONS
IN MEDICAL AND DENTAL EDUCATION

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COSTS AND FINANCIAL IMPLICATIONS IN MEDICAL AND DENTAL EDUCATION

Financing medical and dental education is a major concern of state and federal governments and of the medical and dental education community. The latter includes all medical and dental schools in the United States and more than 400 major teaching hospitals.

Contemporary undergraduate medical and dental education, and the complex environment in which it occurs, must be placed in perspective for a proper understanding of its cost.

Medical and dental schools are institutions with multiple objectives, dictated by the needs and desires of the American people. Their basic mission is threefold: to educate physicians, dentists, and other health professionals; to service some of the health needs of the community; and to advance the fund of biomedical knowledge through the research activities of faculty and staff.

The latter two activities are essential to society, but they also are essential to the education of a medical or dental student. The task of deriving estimates of an educational program's cost requires a determination of levels of activities in addition to instruction necessary to undergraduate health professional education.

Flexibility in Programs

Medical and dental education in the United States is characterized by a variety in curricular format, educational methodology, and manner of presentation. Flexibility is essential to continued vigor and innovation in the education system. It enables institutions to develop fully the varying capabilities and aspirations of the students and to educate

individuals for careers in all types of medicine and dentistry, from general or family practice to the most complex dental, medical or surgical specialty, or to an academic career.

Health Planners' Objective

The ultimate objective of health planners is to provide quality care, to make it reasonably accessible, and to keep the cost within an acceptable range. In order to adequately serve the health needs of the public, there should be a strong emphasis on prevention, and there should be an environment of study, investigation, and discovery. Education in medicine, dentistry, and related fields is the medium for achieving these objectives.

The impact of ancillary personnel is so directly related to the financial implications of medical and dental education that it cannot be ignored. Various other factors, such as environmental condition, social status, ethnic background, and religious convictions, may indirectly affect the projected needs in medical and dental education.

Costs of Medical and Dental Education

Health science schools vary widely in computing costs of instruction. Some of the factors significantly affecting computations are:

- The type of parent institution
- The number and types of programs
- Cooperation of affiliated institutions
- Volunteer instructional service
- Capital investment in physical facilities
- Depreciation of buildings and equipment

Elements of Education

Activities other than instruction are essential to quality educational programs for physicians and dentists.

Some of the essential activities that contribute to the overall milieu necessary for quality education are:

1) Research. Although it may be possible to separate research from education, educational programs at a professional level thrive best in an environment that includes research. Because of the importance of investigation to programs of education, the cost of research should become an integral part of the cost of instruction. The most accurate reflection of these costs could be obtained by separating the institutional support from the contracted or sponsored support. In this way, there could be a differentiation between the research which is necessary for instruction and that which is conducted on a sponsored or contracted basis.

2) Patient Care. All programs in medical and dental education include service in the form of patient care. This type of service cannot be separated from the cost of instruction. In some instances, the clinical facilities become a part of the educational institution, and in other instances, cooperative arrangements are made to use a separate facility for patient care. Because of the variation in the manner in which hospitals are used in education, these should be considered as a separate item in relation to a cost analysis. In schools of medicine and osteopathy, clinical facilities are most often separated from the educational plant. On the other hand, schools of dentistry normally include

facilities for the major part of patient care.

3) Community Service. Recent trends in medical and dental education include special attention to off-campus community service. Because community service has been incorporated into the curricular requirements, it should also be included in the cost of instruction. The extent of community projects is on the increase, and projections for the next two decades should take this into consideration. Among such projects are those referred to as storefront clinics, mobile clinics for both urban and rural areas, well-baby clinics, and mass vaccination programs. Such projects are desirable both to broaden the educational experiences of the students and as a recruitment device to bring future practitioners into geographical areas of need.

4) Programs of Advanced Education. Graduate and postgraduate education related to the health fields is sometimes separated from the costs of medical education. However, programs of advanced education are significantly important to the quality and progressiveness of the health fields. Schools of medicine, osteopathy, and dentistry strive to recruit the highest quality educators for their programs. Unless the schools provide advanced educational opportunities, recruitment and retention of competent faculty become increasingly difficult. Provision should be made for the cost of advanced education.

5) Continuing Education. Members of the health professions are obligated to follow an organized program for updating and refreshing their knowledge and skills. This objective may

be achieved by participation in study clubs, seminars, and courses from one to a number of days' duration. Educational institutions are the most logical setting for presentation of these programs. They also should provide leadership in organizing the programs and in providing instructional personnel, whether or not they actually carry out the programs. Although continuing education can be budgeted as a separate entity, it should be included as a part of overall cost for medical or dental education.

6) Administration. Cost computations for medical and dental education should include expenditures for the administration of these programs. In some institutions the general administration is shared by a number of separate units. Each individual unit (e.g., medical or dental education) normally maintains an extensive administrative staff. Administrative functions are essential. A realistic projection of costs for medical and dental education will include administrative expenditures directly related to the program and a pro rata portion of the administrative expenditures of the parent institution. Guidelines are needed for establishing uniformity in designating services to be identified as administration.

7) Operational Costs. Each academic department, administrative unit, public service facility, maintenance shop, and the like requires an operating budget. These expenditures are essential to the educational process and therefore should be included in the cost computations. Certain expenditures, however, which are frequently labeled "operating costs," should be placed

in other categories. Such items include capital improvements, rentals, parking, fringe benefits for personnel, and grounds keeping. The factors of appreciation and depreciation play a significant part in determining operational costs.

Teaching Hospitals and Medical Education

Clinical experience is essential to all health education programs. For the medical student, the clinical experience is obtained, by and large, within the hospital environment. In many instances, the establishment of a new medical school will include the construction of a teaching hospital. In other instances, arrangements can be made to use existing hospital facilities for teaching purposes. Hospitals are planned basically for patient care, although teaching may become a responsibility. Because there is a difference between hospital service and hospital teaching, and because the construction is so costly, hospitals probably should be considered as a separate entity in determining cost implications of medical education. It should be possible, however, to prorate the costs attributed to education when appropriate.

Other Professionals in Health Care

The need for more physicians and dentists is affected by the role of other health professionals. There are many well established groups, and others are emerging. For the present, attention is directed to the pharmacist, nurse, optometrist, chiropractor, podiatrist, dental hygienist, and physician's assistant. All of these contribute to the health care needs of the public; yet the cost of their education is only a fraction of that for medicine and dentistry. If these adjunct

professionals are permitted expanded functions, there will be a positive effect on the costs for medical and dental education in the future.

Prevention and Patient Education

The prevention of disease is just as important as the treatment of illness. Too little attention has been given to preventive measures and to patient education. A concentrated effort to implement these measures should have a positive impact on the need for physicians and dentists.

Recent Cost Studies

Two recent studies have been made to provide guidelines for the identification of the elements in health professional education and, through examination of representative institutions, to establish a realistic range of cost factors.

The Association of American Medical Colleges in 1970 asked its Committee on the Financing of Medical Education to consider, among other things, the problems related to deriving estimates of the cost of the resources required for the education program leading to the doctor of medicine degree.

The work of the committee, which began early in 1971, represents the combined efforts of medical educators, lay persons, and representatives of twelve medical schools selected to provide data for the study. The committee's report, "Undergraduate Medical Education, Elements - Objectives - Costs," was published in October, 1973.

Six of the medical schools studied in the report are private, and six are publicly owned. Student enrollment ranges from 300 to more than

500. The cost estimates in the report are viewed as guideline measures. They are not necessarily typical or average. Costs at the other 100 medical schools will not necessarily fall within the range of estimates for these twelve schools.

The purpose behind the AAMC's cost-finding exercise was to provide a set of data as the necessary first step for the next phase of the committee's work. A study has now been made of the financing of undergraduate medical education. This second study, under consideration by the AAMC, was conducted to assure an equitable distribution of cost among the students and society, and to insure the continued existence of the educational institutions.

Another study was requested as a result of the Comprehensive Health Manpower Act of 1971 (Public Law 92-157). The Act introduced a new method of federal aid for education in the health professions: direct payments to schools on the basis of their enrollment, or "capitation" grants. The Institute of Medicine, National Academy of Sciences, was asked to provide estimates of the education costs per student in each of the eight health professions covered by the Act, including medicine, osteopathy, and dentistry.

The Institute of Medicine's report on its study, "Costs of Education in the Health Professions," was published in January, 1974.

The range of annual per student costs for medical education varied in the two reports. In the Institute of Medicine report, costs varied from $6,900 to $18,650. In the AAMC report, the costs varied from $16,000 to $26,000. This wide variance, however, is misleading. The Institute of Medicine used as its basis for determining costs a "net education expenditure" formula, which includes only the unfunded portion

of education costs. The net is calculated by subtracting from education costs the income received from research and patient-care activities. It identifies that portion of the cost of education not offset by research and patient-care income, which is the portion for which financing from education funds is required.

On the other hand, the AAMC report calculated costs of all elements of medical education, disregarding any income generated by those elements. The AAMC committee's second report, to be released soon, presents its recommendations for and estimates of the financing of medical education, as opposed to actual costs.

The information collected by the Institute of Medicine and by AAMC's Committee on the Financing of Medical Education is important to an understanding of the costs of health professional education. Their conclusions and recommendations undoubtedly will carry great weight in future plans, on the state as well as federal levels, for financing medical, osteopathic, and dental education.

SUPPLEMENTARY TABLES AND ILLUSTRATIONS

TABLE 30

FRESHMAN CLASS SIZES OF MEDICAL AND OSTEOPATHIC SCHOOLS IN TEXAS

	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
BAYLOR	84	84	84	84	84	84	84	92	124	144	168	168	168
TEXAS COLLEGE OF OSTEOPATHIC MEDICINE									20	32	51	54	60
TEXAS TECH											36	38	40
UNIVERSITY OF TEXAS													
DALLAS	100	100	100	100	106*	109*	105	107	113*	122	128	152	200
GALVESTON	140	154	152	155	162*	164*	163	168	177*	175	204	205	205
HOUSTON									(19)	32	49	48	52
SAN ANTONIO					(15)	(7)	56	104	105	113	116	122	122
TOTALS	324	338	336	339	352	357	408	471	539	618	752	787	847
# Increase		14	-2	3	13	5	51	63	68	79	134	35	60
% Increase		4.32	-.59	.89	3.83	1.42	14.29	15.44	14.44	14.66	21.68	4.65	7.62

TOTAL # INCREASE -- 523

TOTAL % INCREASE -- 161.42

Includes Repeaters and Transfers
*Includes students for 1) San Antonio in 1966 and 1967: and
2) Houston in 1970
()Counted in other schools' totals

SOURCE: Staff of Coordinating Board, Texas College and University System, based on figures from each school.

TABLE 31

PROJECTIONS OF FRESHMAN CLASS SIZES
OF THE MEDICAL AND OSTEOPATHIC SCHOOLS IN TEXAS
1975-1980

	1975	1976	1977	1978	1979	1980
BAYLOR	168	168	168	168	168	168
TEXAS A&M-BAYLOR	32	32	32	32	32	32
TEXAS COLLEGE OF OSTEOPATHIC MEDICINE	60	60	60	60	60	60
TEXAS TECH	40	100	100	100	125	125
UNIVERSITY OF TEXAS						
DALLAS	200	200	200	200	200	200
GALVESTON	203	203	203	203	203	203
HOUSTON	62	100	100	160	160	160
SAN ANTONIO	122	122	122	200*	200*	200*
TOTALS	887	985	985	1,123	1,148	1,148

*To reach its estimated goal of 200 entering students, San Antonio estimates a need of an additional 400,000 square feet at a cost of approximately $25 million.

SOURCE: Staff of Coordinating Board, Texas College and University System, based on projected figures from each school.

TABLE 32

PHYSICIANS GRADUATED FROM TEXAS MEDICAL AND OSTEOPATHIC SCHOOLS 1966-1974

School	1966	1967	1968	1969	1970	1971	1972	1973	1974
BAYLOR	83	79	85	85	88	89	83*	111	226**
TEXAS COLLEGE OF OSTEOPATHIC MEDICINE	0	0	0	0	0	0	0	0	18
TEXAS TECH	0	0	0	0	0	0	0	0	24
UNIVERSITY OF TEXAS									
DALLAS	83	95	97	96	107	109	102	114	112
GALVESTON	119	150	139	138	148	133	150	165	190
HOUSTON	0	0	0	0	0	0	0	0	52***
SAN ANTONIO	0	0	0	0	33	30	71	101	96
TOTALS	285	324	321	319	376	361	406	491	718

*Plus one awarded posthumously

**Includes 47 graduates in September, 1973; 34 in December, 1973; 145 in May, 1974

***Includes 22 graduates in December, 1973; 30 in June, 1974

SOURCE: Staff of Coordinating Board, Texas College and University System

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TABLE 33

APPROVED MEDICAL SCHOOLS AND SCHOOLS OF BASIC MEDICAL SCIENCES

State	No.	Medical Schools	Ownership	Year Organized	Tuition (Est.) 1974-1975* Resident	Tuition (Est.) 1974-1975* Nonresident	Students, 1972-1973 1st yr	Students, 1972-1973 Other Years	Students, 1972-1973 Total	Graduates 7/1/72 to 6/30/73	Dean or Executive Officer	No.
Ala	1	University of Alabama School of Medicine, Birmingham	Pub	1859	1,600†	2,400†	125	327	452	95	James A. Pittman, Jr., MD	1
Ariz	2	University of Arizona College of Medicine, Tucson	Pub	1967	960	1,850	76	189	265	61	Merlin K. DuVal, MD	2
Ark	3	University of Arkansas School of Medicine, Little Rock	Pub	1879	850	1,700	121	311	432	99	Winston K. Shorey, MD	3
Calif	4	University of California School of Medicine, Davis	Pub	1968	670	2,170	102	196	298	49	C. J. Tupper, MD	4
	5	University of California College of Medicine, Irvine	Pub	1962	908	2,408	70	194	264	73	Stanley van den Noort, MD	5
	6	Loma Linda University School of Medicine, Loma Linda	Pri	1909	3,200	3,200	171	364	535	97	David B. Hinshaw, MD	6
	7	University of California School of Medicine, Los Angeles	Pub	1951	681†	2,181†	148	414	562	136	Sherman M. Mellinkoff, MD	7
	8	University of Southern California School of Medicine, Los Angeles	Pri	1885	3,040	3,040	114	281	395	85	Franz K. Bauer, MD	8
	9	Stanford University School of Medicine, Palo Alto	Pri	1908	3,345	3,345	88	286	374	89	Clayton Rich, MD	9
	10	University of California School of Medicine, San Diego	Pub	1968	800	2,300	69	155	224	51	John H. Moxley, III, MD	10
	11	University of California School of Medicine, San Francisco	Pub	1864	700	2,200	147	408	555	136	Julius R. Krevans, MD	11
Colo	12	University of Colorado School of Medicine, Denver	Pub	1883	1,035	2,442	126	370	496	114	Harry P. Ward, MD	12
Conn	13	University of Connecticut School of Medicine, Farmington	Pub	1968	950	1,850	64	97	161	31	Robert U. Massey, MD	13
	14	Yale University School of Medicine, New Haven	Pri	1812	3,800	3,800	102	280	382	88	Lewis Thomas, MD	14
DC	15	Georgetown University School of Medicine	Pri	1851	3,000	3,000	213	491	704	119	John P. Utz, MD	15
	16	George Washington University School of Medicine	Pri	1825	3,275	3,275	146	370	516	120	James J. Feffer, MD	16
	17	Howard University College of Medicine	Pri	1868	1,200	1,200	142	327	469	94	Marion Mann, MD	17
Fla	18	University of Florida College of Medicine, Gainesville	Pub	1956	1,050	2,250	86	205	291	61	Chandler A. Stetson, MD	18
	19	University of Miami School of Medicine, Miami	Pri	1952	2,600	2,600	135	398	533	131	Emanuel M. Papper, MD	19
Ga	20	Emory University School of Medicine, Atlanta	Pri	1854	2,650	2,650	106	293	399	96	Arthur P. Richardson, MD	20
	21	Medical College of Georgia, Augusta	Pub	1828	900	1,800	165	404	569	131	Curtis H. Carter, MD	21
Ill	22	Chicago Medical School University of Health Sciences, Chicago	Pri	1912	12,000‡	12,000‡	93	257	350	82	Henri S. Havdala, MD (Actg)	22
	23	Northwestern University Medical School, Chicago	Pri	1859	3,000	3,000	171	471	642	143	James E. Eckenhoff, MD	23
	24	Loyola University of Chicago Stritch School of Medicine	Pri	1915	833§	833§	133	355	488	105	Joseph A. Wells, PhD, MD	24
	25	Rush Medical College, Chicago	Pri	1969	950	950	67	131	198	32	William F. Hejna, MD	25
	26	University of Chicago Pritzker School of Medicine, Chicago	Pri	1927	3,000	3,000	104	311	415	83	Leon O. Jacobson, MD	26
	27	University of Illinois College of Medicine, Chicago	Pub	1881	1,107	2,097	287	676	963	214	William J. Grove, MD	27
Ind	28	Indiana University School of Medicine, Indianapolis	Pub	1903	1,000	2,100	290	752	1,042	222	George T. Lukemeyer, MD (Actg)	28
Iowa	29	University of Iowa College of Medicine, Iowa City	Pub	1850	870	1,600	171	456	627	144	John W. Eckstein, MD	29
Kan	30	University of Kansas School of Medicine, Kansas City	Pub	1905	3,075‡	6,075‡	157	392	549	120	William O. Reike, MD	30
Ky	31	University of Kentucky College of Medicine, Lexington	Pub	1954	910	1,805	108	275	383	81	William S. Jordan, Jr., MD	31
	32	University of Louisville School of Medicine, Louisville	Pri	1837	1,225	2,150	140	338	478	93	Richard H. Swigart, MD (Actg)	32
La	33	Louisiana State University School of Medicine, New Orleans	Pub	1931	800	2,000	158	420	578	132	Silas E. O'Quinn, MD (Actg)	33
	34	Tulane University School of Medicine, New Orleans	Pri	1834	2,610	2,610	149	425	574	139	William G. Thurman, MD	34
	35	Louisiana State University School of Medicine, Shreveport	Pub	1966	800	2,000	42	105	147	31	Clifford G. Grulee, Jr., MD	35
Md	36	Johns Hopkins University School of Medicine, Baltimore	Pri	1893	3,000	3,000	121	329	450	110	Russell H. Morgan, MD	36
	37	University of Maryland School of Medicine, Baltimore	Pub	1807	1,200	2,300	162	422	584	139	John M. Dennis, MD	37
Mass	38	Boston University School of Medicine, Boston	Pri	1873	3,200	3,200	124	310	434	93	Ephraim Friedman, MD	38
	39	Harvard Medical School, Boston	Pri	1783	3,250	3,250	165	500	665	167	Robert H. Ebert, MD	39
	40	Tufts University School of Medicine, Boston	Pri	1893	3,300	3,300	142	429	571	146	William F. Maloney, MD	40
Mich	41	University of Michigan Medical School, Ann Arbor	Pub	1850	1,260	2,540	248	664	912	203	John A. Gronvall, MD	41
	42	Wayne State University School of Medicine, Detroit	Pub	1885	1,295	2,650	240	502	742	121	Robert D. Coye, MD	42
	43	Michigan State University College of Human Medicine, East Lansing	Pub	1966	1,200	2,600	89	166	255	28	Andrew D. Hunt, Jr., MD	43
Minn	44	University of Minnesota Medical School, Minneapolis	Pub	1883	1,350	2,800	249	631	880	181	N. L. Gault, Jr., MD	44
Miss	45	University of Mississippi School of Medicine, Jackson	Pub	1903	850	1,450	117	286	403	91	Norman C. Nelson, MD	45

Mo	46	University of Missouri School of Medicine, Columbia	Pub	1840	690*	1,650	112	312	424	99	William D. Mayer, MD	46
	47	University of Missouri School of Medicine, Kansas City	Pub	1968	1,034	2,772	30	36	66	9	Richardson K. Noback, MD	47
	48	Saint Louis University School of Medicine, St. Louis	Pri	1903	2,700	2,700	156	410	566	122	Robert H. Felix, MD	48
	49	Washington University School of Medicine, St. Louis	Pri	1899	2,750	2,750	128	339	467	97	M. Kenton King, MD	49
Neb	50	Creighton University School of Medicine, Omaha	Pri	1892	3,100	3,100	106	293	399	83	Joseph M. Holthaus, MD	50
	51	University of Nebraska College of Medicine, Omaha	Pub	1881	850	1,750	152	369	521	132	Robert B. Kugel, MD	51
NH	52	Dartmouth Medical School, Hanover	Pri	1797	3,450	3,450	66	70	136	18	James C. Strickler, MD	52
NJ	53	CMDNJ-New Jersey Medical School, Newark	Pub	1956	1,100	1,750	121	327	448	109	Harold A. Kaminetsky, MD	53
NM	54	University of New Mexico School of Medicine, Albuquerque	Pub	1960	685	1,545	65	150	215	40	Leonard M. Napolitano, PhD	54
NY	55	Albany Medical College of Union University, Albany	Pri	1839	2,750	2,750	110	272	382	80	Harold C. Wiggers, PhD, ScD	55
	56	State University of New York at Buffalo School of Medicine	Pub	1846	1,705	2,104	139	366	505	115	Clyde L. Randall, MD	56
	57	Columbia University College of Physicians & Surgeons, New York	Pri	1767	3,100	3,100	149	414	563	127	Donald F. Tapley, MD (Actg)	57
	58	Cornell University Medical College, New York	Pri	1898	2,750	2,750	103	276	379	91	J. Robert Buchanan, MD	58
	59	Albert Einstein College of Medicine of Yeshiva University, NY	Pri	1955	3,000	3,000	183	348	531	113	Ernst R. Jaffe, MD (Actg)	59
	60	Mount Sinai School of Medicine of the City University of NY	Pri	1968	3,000	3,000	46	146	192	48	Thomas C. Chalmers, MD	60
	61	New York Medical College, New York	Pri	1860	3,647	3,647	165	434	599	141	Lawrence B. Slobody, MD	61
	62	New York University School of Medicine, New York	Pri	1841	3,000	3,000	159	415	574	133	Ivan L. Bennett, Jr., MD	62
	63	State University of New York College of Medicine, Brooklyn	Pub	1860	1,500	2,000	225	604	829	188	Paul Dreizen, MD	63
	64	University of Rochester School of Medicine & Dentistry, Rochester	Pri	1920	3,049	3,049	100	266	366	81	J. Lowell Orbison, MD	64
	65	State University of New York College of Medicine, Syracuse	Pub	1834	1,665	2,065	123	341	464	114	Richard P. Schmiot, MD	65
NC	66	University of North Carolina School of Medicine, Chapel Hill	Pub	1879	757	2,482	133	296	429	87	Christopher C. Fordham, III, MD	66
	67	Duke University School of Medicine, Durham	Pri	1930	2,700	2,700	119	306	425	71	Thomas D. Kinney, MD	67
	68	Bowman Gray School of Medicine, Winston-Salem	Pri	1902	2,500	2,500	89	226	315	75	Richard Janeway, MD	68
Ohio	69	University of Cincinnati College of Medicine, Cincinnati	Pub	1819	1,350*	2,250	124	344	468	112	Robert S. Daniels, MD (Actg)	69
	70	Case Western Reserve University School of Medicine, Cleveland	Pri	1843	2,800	2,800	139	329	468	87	Frederick C. Robbins, MD	70
	71	Ohio State University College of Medicine, Columbus	Pub	1914	1,200	2,600	235	601	836	347	Henry G. Cramblett, MD	71
	72	Medical College of Ohio at Toledo	Pub	1964	1,200	1,800	50	83	133	31	Robert G. Page, MD	72
Okla	73	University of Oklahoma School of Medicine, Oklahoma City	Pub	1900	749	1,669	150*	386	536	115	Robert M. Bird, MD	73
Ore	74	University of Oregon Medical School, Portland	Pub	1887	903	1,962	114	283	397	80	Charles N. Holman, MD	74
Pa	75	Pennsylvania State University College of Medicine, The Milton S. Hershey Medical Center, Hershey	Pri	1967	1,200	2,400	84	199	283	63	Harry Prytowsky, MD	75
	76	Hahnemann Medical College and Hospital, Philadelphia	Pri	1848	2,900	2,900	159	363	522	108	Joseph R. DiPalma, MD	76
	77	Jefferson Medical College of Thomas Jefferson University, Philadelphia	Pri	1824	2,500	2,500	227	605	832	184	William F. Kellow, MD	77
	78	Medical College of Pennsylvania (Formerly Woman's), Philadelphia	Pri	1850	3,000	3,000	78	228	306	71	Bernard Sigel, MD	78
	79	Temple University School of Medicine, Philadelphia	Pri	1901	970	2,080	183	482	665	145	Roger W. Sevy, MD, PhD	79
	80	University of Pennsylvania School of Medicine, Philadelphia	Pri	1765	3,150	3,150	159	466	625	151	Alfred Gellhorn, MD	80
	81	University of Pittsburgh School of Medicine, Pittsburgh	Pri	1883	1,200	2,400	140	354	494	106	Donald N. Medearis, Jr., MD	81
PR	82	University of Puerto Rico School of Medicine, San Juan	Pub	1949	585	585	112	288	400	92	Carlos E. Girod, MD	82
SC	83	Medical University of South Carolina College of Medicine, Charleston	Pub	1823	1,000	1,840	166	411	577	121	J. F. A. McManus, MD	83
Tenn	84	University of Tennessee College of Medicine, Memphis	Pub	1851	1,300	2,700	218	470	688	180	T. Albert Farmer, Jr., MD	84
	85	Meharry Medical College School of Medicine, Nashville	Pri	1876	2,175	2,175	103	260	363	82	Ralph J. Cazort, MD	85
	86	Vanderbilt University School of Medicine, Nashville	Pri	1873	2,600	2,600	84	215	299	59	Allan D. Bass, MD (Actg)	86
Tex	87	University of Texas Southwestern Medical School, Dallas	Pub	1943	430	930	128	342	470	104	Frederick J. Bonte, MD	87
	88	University of Texas Medical Branch, Galveston	Pub	1887	488	1,288	204	491	695	160	Edward N. Brandt, Jr., MD (Actg)	88
	89	Baylor College of Medicine, Houston	Pri	1900	400	2,800	169	380	549	111	Michael E. DeBakey, MD	89
	90	University of Texas Medical School, San Antonio	Pub	1968	542	1,342	116	310	426	101	Stanley F. Crawford, MD	90
Utah	91	University of Utah College of Medicine, Salt Lake City	Pub	1905	850	1,450	101	251	352	73	John A. Dixon, MD	91
Vt	92	University of Vermont College of Medicine, Burlington	Pub	1822	950	2,400	83	218	301	78	William H. Luginbuhl, MD	92
Va	93	University of Virginia School of Medicine, Charlottesville	Pub	1825	1,037	2,062	122	302	424	86	William R. Drucker, MD	93
	94	Medical College of Virginia, Richmond	Pub	1838	1,155	2,255	146	386	532	129	Warren H. Pearse, MD	94
Wash	95	University of Washington School of Medicine, Seattle	Pub	1945	900	1,900	130	321	451	98	Robert L. Van Citters, MD	95
WVa	96	West Virginia University School of Medicine, Morgantown	Pub	1902	546	1,257	84	230	314	76	John E. Jones, MD (Actg)	96

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TABLE 33 -- Continued

APPROVED MEDICAL SCHOOLS AND SCHOOLS OF BASIC MEDICAL SCIENCES

State	No.	Medical Schools	Ownership	Year Organized	Tuition (Est.) 1974-1975* Resident	Tuition (Est.) 1974-1975* Nonresident	Students, 1972-1973 1st yr	Students, 1972-1973 Other Years	Students, 1972-1973 Total	Graduates 7/1/72 to 6/30/73	Dean or Executive Officer	No.
Wis	97	University of Wisconsin Medical School, Madison	Pub	1907	1,200	3,000	132	367	499	108	Lawrence G. Crowley, MD	97
	98	Medical College of Wisconsin, Milwaukee	Pri	1913	2,365	2,365	129	318	447	104	Gerald A. Kerrigan, MD	98
		Subtotals					**13,091**	**33,262**	**46,353**	**10,391**		
		Approved Schools of Basic Medical Sciences										
Hawaii	99	University of Hawaii School of Medicine, Honolulu**	Pub	1967	220	730	67	75	142	..	Terence A. Rogers, PhD	99
Nev	100	University of Nevada School of Medical Sciences, Reno	Pub	1967	759	2,159	46	32	78	..	George T. Smith, MD	100
NJ	101	CMDNJ-Rutgers Medical School, Piscataway**	Pub	1966	1,250	1,900	88	115	203	..	James W. Mackenzie, MD	101
ND	102	University of North Dakota School of Medicine, Grand Forks	Pub	1905	606	1,554	63	65	128	..	John W. Vennes, PhD (Actg)	102
RI	103	Brown University Program in Medical Science, Providence**	Pri	1963	3,250	3,250	55	52	107	..	Stanley M. Aronson, MD	103
SD	104	University of South Dakota School of Medicine, Vermillion	Pub	1907	733	1,607	65	53	118	..	Karl H. Wegner, MD	104
		Subtotals					**384**	**392**	**776**	..		
		Developing Medical School-Operational (Not yet eligible for approval)										
Ala	105	University of South Alabama College of Medicine, Mobile	Pub	1967	675†	1,875†	25	..	25	..	Robert M. Bucher, MD	105
Fla	106	University of South Florida College of Medicine, Tampa	Pub	1965	1,050	2,250	24	24	48	..	Donn L. Smith, MD	106
Mass	107	University of Massachusetts Medical School, Worcester	Pub	1962	600	..	25	40	65	..	Lamar Soutter, MD	107
Minn	108	Mayo Medical School, Rochester	Pri	1971	1,350	2,800	40	..	40	..	Raymond D. Truitt, MD	108
	109	University of Minnesota School of Medicine, Duluth	Pub	1972	1,216	2,540	24	..	24	..	Robert E. Talter, MD	109
NY	110	State University of New York at Stony Brook School of Medicine	Pub	1962	1,600	2,000	26	22	48	..	Marvin Kuschner, MD	110
Tex	111	University of Texas Medical School, Houston	Pub	1969	335	935	49	55	104	..	Cheves McC. Smythe, MD	111
	112	Texas Tech University School of Medicine, Lubbock	Pub	1969	681	1,481	38	25	63	..	William W. Frye, PhD, MD	112
		Subtotals					**251**	**166**	**417**	..		
		Totals					**13,726**	**33,820**	**47,546**	**10,391**		

*From Medical School Admission Requirements 1974-1975 U.S.A. and CANADA, Association of American Medical Colleges.
†For three quarters.
‡For total curriculum.
§Per quarter.
Fees only, no tuition.
¶Tuition for residents of Cincinnati: $1,200.
**In transition to MD degree-granting institution.

SOURCE: Medical Education in the United States 1972-1973. Reprinted from the Education Number of the Journal of the American Medical Association, November 19, 1973.

TABLE 34

SOURCE OF FOREIGN M.D.'s LICENSED TO PRACTICE IN TEXAS

Year	Foreign-born by Exam	U.S.-born by Exam	Foreign-born by Reciprocity	U.S.-born by Reciprocity	Total
1968	75	8	65	2	148
1969	69	8	74	7	158
1970	73	6	77	11	167
1971	107	6	92	8	213
1972	68	3	128	8	207
1973	119	11	145	7	282

SOURCE: Texas State Board of Medical Examiners.

TABLE 35

NON-FEDERAL PHYSICIANS IN TEXAS 1966

Specialty	Total Physicians	PATIENT CARE = Total*	Practice	HOSPITAL BASED PRACTICE Interns	Residents	Full-Time Physician Staff	Other Professional Activity+
TOTAL PHYSICIANS	11,461	10,402	8,679	281	1,041	401	573
GENERAL PRACTICE	3,294	3,276	3,208	3	17	48	18
MEDICAL SPECIALTIES	2,238	2,043	1,632	35	291	85	195
SURGICAL SPECIALTIES	3,199	3,099	2,613	21	411	54	100
OTHER SPECIALTIES	2,244	1,984	1,226	222	322	214	260
PRIMARY CARE#	2,590	2,404	1,954	35	337	78	186

SOURCE: Distribution of Physicians in the United States 1966, Center for Health Services Research and Development, American Medical Association.

* Total does not include Not Classified or Inactive.

\# For purposes of comparison, General Practice figures are omitted in this category, which includes these Primary Care specialties: Internal Medicine, Pediatrics, and Obstetrics and Gynecology. These figures also are included in the Specialty counts.

\+ Other Professional Activity as cited here includes Medical Teaching, Administration Research, and Other.

= Statistical procedures were changed in 1968, resulting in the reclassification of certain physicians. In this chart, Office Based Practice figures were classified as Solo, Partnership, Group or Other Practice. Residents and Fellows are grouped together under Hospital Based Practice.

TABLE 35 -- Continued

NON-FEDERAL PHYSICIANS IN TEXAS 1967

Specialty	Total Physicians	PATIENT CARE =					Other Professional Activity+
				HOSPITAL BASED PRACTICE			
		Total*	Practice	Interns	Residents	Full-Time Physician Staff	
TOTAL PHYSICIANS	11,760	10,644	8,860	304	1,068	412	635
GENERAL PRACTICE	3,266	3,247	3,177	1	20	49	19
MEDICAL SPECIALTIES	2,333	2,121	1,680	46	296	99	212
SURGICAL SPECIALTIES	3,300	3,193	2,684	31	417	61	107
OTHER SPECIALTIES	2,380	2,083	1,319	226	335	203	297
PRIMARY CARE#	2,696	2,496	2,020	47	266	90	200

SOURCE: Distribution of Physicians in the United States 1967, Center for Health Services Research and Development, American Medical Association.

* Total does not include Not Classified or Inactive.

\# For Purposes of comparison, General Practice figures are omitted in this category, which includes these Primary Care specialties: Internal Medicine, Pediatrics, and Obstetrics and Gynecology. These figures also are included in the Specialty counts.

\+ Other Professional Activity as cited here includes Medical Teaching, Administration, Research, and Other.

= Statistical procedures were changed in 1968, resulting in the reclassification of certain physicians. In this chart, Office Based Practice figures were classified as Solo, Partnership, Group or Other Practice. Residents and Fellows are grouped together under Hospital Based Practice.

TABLE 35 -- Continued

NON-FEDERAL PHYSICIANS IN TEXAS 1968

Specialty	Total Physicians	PATIENT CARE					Other Professional Activity+
				HOSPITAL BASED PRACTICE			
		Total*	Practice	Interns	Residents	Full-Time Physician Staff	
TOTAL PHYSICIANS	12,144	10,545	8,694	343	1,063	445	918
GENERAL PRACTICE	2,962	2,932	2,825	17	28	62	30
MEDICAL SPECIALTIES	2,476	2,170	1,779	56	237	98	306
SURGICAL SPECIALTIES	3,365	3,226	2,692	34	439	61	139
OTHER SPECIALTIES	2,660	2,217	1,398	236	359	224	443
PRIMARY CARE#	2,595	2,360	1,936	59	299	66	235

SOURCE: Distribution of Physicians in the United States 1968, Center for Health Services Research and Development, American Medical Association.

* Total does not include Not Classifed or Inactive.

\# For purposes of comparison, General Practice figures are omitted in this category, which includes these Primary Care specialties: Internal Medicine, Pediatrics, and Obstetrics and Gynecology. These figures also are included in the Specialty counts.

\+ Other Professional Activity as cited here includes Medical Teaching, Administration, Research, and Other

TABLE 35 -- Continued

NON-FEDERAL PHYSICIANS IN TEXAS 1969

Specialty	Total Physicians	PATIENT CARE					Other Professional Activity+
		Total*	Practice	HOSPITAL BASED PRACTICE			
				Interns	Residents	Full-Time Physician Staff	
TOTAL PHYSICIANS	12,566	11,018	9,006	395	1,156	461	850
GENERAL PRACTICE	2,919	2,886	2,772	23	36	55	33
MEDICAL SPECIALTIES	2,544	2,268	1,837	95	230	106	276
SURGICAL SPECIALTIES	3,484	3,368	2,789	50	455	74	116
OTHER SPECIALTIES	2,921	2,496	1,608	227	435	226	425
PRIMARY CARE#	2,633	2,426	2,079	97	307	241	207

SOURCE: Distribution of Physicians in the United States 1969, Center for Health Services Research and Development, American Medical Association.

* Total does not include Not Classified or Inactive.

\# For purposes of comparison, General Practice figures are omitted in this category, which includes these Primary Care specialties: Internal Medicine, Pediatrics, and Obstetrics and Gynecology. These figures also are included in the Specialty counts.

\+ Other Professional Activity as cited here includes Medical Teaching, Administration, Research, and Other.

TABLE 35 -- Continued

NON-FEDERAL PHYSICIANS IN TEXAS 1970

Specialty	Total Physicians	PATIENT CARE					Other Professional Activity+
		Total*	Practice	HOSPITAL BASED PRACTICE			
				Interns	Residents	Full-Time Physician Staff	
TOTAL PHYSICIANS	12,977	11,380	9,287	369	1,222	502	891
GENERAL PRACTICE	2,936	2,905	2,774	37	39	55	31
MEDICAL SPECIALTIES	2,748	2,444	1,919	116	29[illegible]	116	304
SURGICAL SPECIALTIES	3,678	3,554	2,955	53	47[illegible]	72	124
OTHER SPECIALTIES	2,909	2,477	1,639	163	41[illegible]	259	432
PRIMARY CARE#	2,849	2,617	2,094	120	322	81	232

SOURCE: Distribution of Physicians in the United States 1970, Center for Health Services Research and Development, American Medical Association.

* Total does not include Not Classified or Inactive.

\# For purposes of comparison, General Practice figures are omitted in this category, which includes these Primary Care specialties: Internal Medicine, Pediatrics, and Obstetrics and Gynecology. These figures also are included in the Specialty counts.

\+ Other Professional Activity as cited here includes Medical Teaching, Administration, Research, and Other.

TABLE 35 -- Continued

NON-FEDERAL PHYSICIANS IN TEXAS 1971

Specialty	Total Physicians	PATIENT CARE					Other Professional Activity+
		Total*	Practice	HOSPITAL BASED PRACTICE			
				Interns	Residents	Full-Time Physician Staff	
TOTAL PHYSICIANS	13,462	11,818	9,603	404	1,309	502	851
GENERAL PRACTICE	2,864	2,836	2,755		28	53	28
MEDICAL SPECIALTIES	2,893	2,612	2,030	124	340	118	281
SURGICAL SPECIALTIES	3,877	3,745	3,058	64	552	71	132
OTHER SPECIALTIES	3,035	2,625	1,760	216	389	260	410
PRIMARY CARE#	3,057	2,825	2,308	131	414	81	232

SOURCE: Distribution of Physicians in the United States 1971, Center for Health Services Research and Development, American Medical Association.

* Total does not include Not Classified or Inactive.

\# For purposes of comparison, General Practice figures are omitted in this category, which includes these Primary Care specialties: Internal Medicine, Pediatrics, and Obstetrics and Gynecology. These figures also are included in the Specialty counts.

\+ Other Professional Activity as cited here includes Medical Teaching, Administration, Research, and Other.

TABLE 35 -- Continued

NON-FEDERAL PHYSICIANS IN TEXAS 1972

Specialty	Total Physicians	PATIENT CARE					Other Professional Activity+
		Total*	Practice	HOSPITAL BASED PRACTICE			
				Interns	Residents	Full-Time Physician Staff	
TOTAL PHYSICIANS	14,192	12,258	9,871	437	1,438	512	829
GENERAL PRACTICE	2,837	2,817	2,732		29	56	20
MEDICAL SPECIALTIES	3,064	2,776	2,101	166	393	116	288
SURGICAL SPECIALTIES	4,045	3,928	3,177	78	599	74	117
OTHER SPECIALTIES	3,141	2,737	1,861	193	417	266	404
PRIMARY CARE#	3,271	3,038	2,284	184	473	87	243

SOURCE: Distribution of Physicians in the United States 1972, Center for Health Services Research and Development, American Medical Association.

* Total does not include Not Classified or Inactive.

\# For purposes of comparison, General Practice figures are omitted in this category, which includes these Primary Care specialties: Internal Medicine, Pediatrics, and Obstetrics and Gynecology. These figures also are included in the Specialty counts.

\+ Other Professional Activity as cited here includes Medical Teaching, Administration, Research, and Other.

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TABLE 36

TEXAS POPULATION/PHYSICIAN RATIOS BY COUNTY
(DIRECT PATIENT CARE)

COUNTY		1970 POPULATION	1972 MD's	1972 DO's	TOTAL PHYSICIANS	RATIO PHYSICIAN/ POPULATION
Anderson	1	27,789	19	2	21	1,323
Andrews	2	10,372	8		8	1,297
Angelina	3	49,349	45		45	1,097
Aransas	4	8,902	6	1	7	1,272
Archer	5	5,759	1		1	5,759
Armstrong	6	1,895		1	1	1,895
Atascosa	7	18,696	6		6	3,116
Austin	8	13,831	12		12	1,153
Bailey	9	8,487	4	1	5	1,697
Bandera	10	4,747	1		1	4,747
Bastrop	11	17,297	6		6	2,883
Baylor	12	5,221	3		3	1,740
Bee	13	22,739	8	1	9	2,526
Bell	14	124,483	196	2	198	629
Bexar	15	830,460	1,114	32	1,146	725
Blanco	16	3,567	2		2	1,784
Borden	17	888				
Bosque	18	10,966	7		7	1,567
Bowie	19	67,813	74	4	78	869
Brazoria	20	108,312	61	2	63	1,719
Brazos	21	57,978	46	1	47	1,234
Brewster	22	7,780	7		7	1,111
Briscoe	23	2,794		1	1	2,794
Brooks	24	8,005	4		4	2,001
Brown	25	25,877	17		17	1,522
Burleson	26	9,999	2		2	5,000
Burnet	27	11,420	9		9	1,269
Caldwell	28	21,178	5		5	4,236
Calhoun	29	17,831	8		8	2,229
Callahan	30	8,205	2	1	3	2,735
Cameron	31	140,368	112	2	114	1,231
Camp	32	8,005	3	2	5	1,601
Carson	33	6,358		4	4	1,590
Cass	34	24,133	14	1	15	1,609
Castro	35	10,394	3		3	3,465
Chambers	36	12,187	5		5	2,437
Cherokee	37	32,008	34		34	941
Childress	38	6,605	6		6	1,101
Clay	39	8,079	3		3	2,693
Cochran	40	5,326	3		3	1,775
Coke	41	3,087	2		2	1,544
Coleman	42	10,288	5		5	2,058
Collin	43	66,920	37	4	41	1,632
Collingsworth	44	4,755	2		2	2,378
Colorado	45	17,638	7	1	8	2,205
Comal	46	24,165	14		14	1,726
Comanche	47	11,898	4	5	9	1,322
Concho	48	2,937		1	1	2,937
Cooke	49	23,471	13	1	14	1,677
Coryell	50	35,311	6		6	5,885

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TABLE 36 -- Continued

COUNTY		1970 POPULATION	1972 MD's	1972 DO's	TOTAL PHYSICIANS	RATIO PHYSICIAN/ POPULATION
Cottle	51	3,204	3		3	1,068
Crane	52	4,172	1		1	4,172
Crockett	53	3,885	2		2	1,943
Crosby	54	9,085	4		4	2,271
Culberson	55	3,429	2		2	1,715
Dallam	56	6,012	3		3	2,004
Dallas	57	1,327,321	2,097	205	2,302	577
Dawson	58	16,604	8		8	2,076
Deaf Smith	59	18,999	10		10	1,900
Delta	60	4,927	2	1	3	1,642
Denton	61	75,633	72	6	78	970
De Witt	62	18,660	10	1	11	1,696
Dickens	63	3,737	1		1	3,737
Dimmitt	64	9,039	4		4	2,260
Donley	65	3,641	1		1	3,641
Duval	66	11,722	4	2	6	1,954
Eastland	67	18,092	11	1	12	1,508
Ector	68	91,805	73	2	75	1,224
Edwards	69	2,107	1		1	2,107
Ellis	70	46,638	22	1	23	2,028
El Paso	71	359,291	328	15	343	1,048
Erath	72	18,141	11		11	1,649
Falls	73	17,300	15	2	17	1,018
Fannin	74	22,705	6	6	12	1,892
Fayette	75	17,650	10	2	12	1,471
Fisher	76	6,344	5		5	1,269
Floyd	77	11,044	4		4	2,761
Foard	78	2,211	1		1	2,211
Fort Bend	79	52,314	35	1	36	1,453
Franklin	80	5,291	2	1	3	1,764
Freestone	81	11,116	8		8	1,390
Frio	82	11,159	2		2	5,580
Gaines	83	11,593	1	2	3	3,864
Galveston	84	169,812	486	1	487	349
Garza	85	5,289	3		3	1,763
Gillespie	86	10,553	8	1	9	1,173
Glasscock	87	1,155				
Goliad	88	4,869	3		3	1,623
Gonzales	89	16,375	2	3	5	3,275
Gray	90	26,949	24		24	1,123
Grayson	91	83,225	79	4	83	1,003
Gregg	92	75,929	82	1	83	915
Grimes	93	11,855	5		5	2,371
Guadalupe	94	33,554	15		15	2,237
Hale	95	34,137	27	4	31	1,101
Hall	96	6,015	3	1	4	1,504
Hamilton	97	7,198	7	2	9	800
Hansford	98	6,351	1	1	2	3,176
Hardeman	99	6,795	3		3	2,265
Hardin	100	29,996	9		9	3,333
Harris	101	1,741,912	2,794	118	2,912	598
Harrison	102	44,841	33		33	1,359

TABLE 36 -- Continued

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COUNTY		1970 POPULATION	1972 MD's	1972 DO's	TOTAL PHYSICIANS	RATIO PHYSICIAN/ POPULATION
Hartley	103	2,782				
Haskell	104	8,512	4		4	2,128
Hays	105	27,642	15		15	1,843
Hemphill	106	3,084	3		3	1,028
Henderson	107	26,466	12	3	15	1,764
Hidalgo	108	181,535	108	7	115	1,579
Hill	109	22,596	19		19	1,189
Hockley	110	20,396	8		8	2,550
Hood	111	6,368	1	4	5	1,274
Hopkins	112	20,710	11	1	12	1,726
Houston	113	17,855	12		12	1,488
Howard	114	37,796	42	2	44	859
Hudspeth	115	2,392				
Hunt	116	47,948	27	5	32	1,498
Hutchinson	117	24,443	14		14	1,746
Irion	118	1,070				
Jack	119	6,711	4		4	1,678
Jackson	120	12,975	7		7	1,854
Jasper	121	24,692	16	1	17	1,453
Jeff Davis	122	1,527				
Jefferson	123	244,773	282	12	294	833
Jim Hogg	124	4,654	2		2	2,327
Jim Wells	125	33,032	18		18	1,835
Johnson	126	45,769	29	2	31	1,476
Jones	127	16,106	7		7	2,301
Karnes	128	13,462	4	1	5	2,692
Kaufman	129	32,392	24	1	25	1,296
Kendall	130	6,964	2	2	4	1,741
Kenedy	131	678				
Kent	132	1,434				
Kerr	133	19,454	30		30	649
Kimble	134	3,904	2		2	1,952
King	135	464				
Kinney	136	2,006				
Kleberg	137	33,166	17		17	1,951
Knox	138	5,972	2		2	2,986
Lamar	139	36,062	32	2	34	1,061
Lamb	140	17,770	13	1	14	1,269
Lampasas	141	9,323	4	1	5	1,865
La Salle	142	5,014	2		2	2,507
Lavaca	143	17,903	10		10	1,790
Lee	144	8,048	3		3	2,683
Leon	145	8,738	4		4	2,185
Liberty	146	33,014	16		16	2,063
Limestone	147	18,100	8	1	9	2,011
Lipscomb	148	3,486				
Live Oak	149	6,697	3		3	2,223
Llano	150	6,979	8	1	9	775
Loving	151	164				
Lubbock	152	179,295	190	27	217	826
Lynn	153	9,107	2		2	4,554
Madison	154	7,693	4		4	1,923

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TABLE 36 -- Continued

COUNTY		1970 POPULATION	1972 MD's	1972 DO's	TOTAL PHYSICIANS	RATIO PHYSICIAN/ POPULATION
Marion	155	8,517	4		4	2,129
Martin	156	4,774	1	2	3	1,591
Mason	157	3,356	2		2	1,678
Matagorda	158	27,913	24		24	1,163
Maverick	159	18,093	10		10	1,809
McCullock	160	8,571	5	1	6	1,429
McLennan	161	147,553	141	5	146	1,011
McMullen	162	1,095				
Medina	163	20,249	8		8	2,531
Menard	164	2,646	1		1	2,646
Midland	165	65,433	60	3	63	1,039
Milam	166	20,028	8		8	2,504
Mills	167	4,212	2	1	3	1,404
Mitchell	168	9,073	6		6	1,512
Montague	169	15,326	9	1	10	1,533
Montgomery	170	49,479	25	1	26	1,903
Moore	171	14,060	9	1	10	1,409
Morris	172	12,310	9	1	10	1,231
Motley	173	2,178	1		1	2,178
Nacogdoches	174	36,362	26		26	1,399
Navarro	175	31,150	33	1	34	916
Newton	176	11,657	2		2	5,829
Nolan	177	16,220	7		7	2,317
Nueces	178	237,544	321	31	352	675
Ochiltree	179	9,706	5		5	1,941
Oldham	180	2,258				
Orange	181	71,170	30	5	35	2,033
Palo Pinto	182	28,962	15	3	18	1,609
Panola	183	15,894	8	1	9	1,766
Parker	184	33,888	11	1	12	2,824
Parmer	185	10,509	3	1	4	2,627
Pecos	186	13,748	6		6	2,291
Polk	187	14,457	6		6	2,410
Potter	188	90,511	148	22	170	532
Presidio	189	4,842	3	1	4	1,211
Rains	190	3,752				
Randall	191	53,855	5	1	6	8,980
Reagan	192	3,239	2		2	1,620
Real	193	2,013		1	1	2,013
Red River	194	14,298	7	1	8	1,787
Reeves	195	16,526	5		5	3,305
Refugio	196	9,494	4		4	2,374
Roberts	197	967		1	1	967
Robertson	198	14,389	6	1	7	2,056
Rockwall	199	7,046	2	2	4	1,762
Runnels	200	12,108	5		5	2,422
Rusk	201	34,102	12	1	13	2,623
Sabine	202	7,187	2	1	3	2,396
San Augustine	203	7,858	3	1	4	1,965
San Jacinto	204	6,702		2	2	3,351
San Patricio	205	47,288	17	4	21	2,252
San Saba	206	5,540	3		3	1,847

TABLE 36 -- Continued

BEST COPY AVAILABLE

COUNTY		1970 POPULATION	1972 MD's	1972 DO's	TOTAL PHYSICIANS	RATIO PHYSICIAN/ POPULATION
Schleicher	207	2,277	2		2	1,136
Scurry	208	15,760	9		9	1,751
Shackelford	209	3,223	2		2	1,612
Shelby	210	19,672	6		6	3,279
Sherman	211	3,657				
Smith	212	97,096	143	13	156	622
Somervell	213	2,793	2		2	1,397
Starr	214	17,707	4		4	4,427
Stephens	215	8,414	4		4	2,104
Sterling	216	1,056	1		1	1,056
Stonewall	217	2,397		1	1	2,397
Sutton	218	3,175	1		1	3,175
Swisher	219	10,373	4		4	2,593
Tarrant	220	716,317	696	122	818	876
Taylor	221	97,853	104	2	106	923
Terrell	222	1,940				
Terry	223	14,118	8	1	9	1,569
Throckmorton	224	2,205	2		2	1,103
Titus	225	16,702	10	6	16	1,044
Tom Green	226	71,047	77	2	79	899
Travis	227	295,576	419	13	432	684
Trinity	228	7,628	5		5	1,526
Tyler	229	12,417	4		4	3,104
Upshur	230	20,976	4	1	5	4,195
Upton	231	4,697	3		3	1,566
Uvalde	232	17,348	9	1	10	1,735
Val Verde	233	27,471	9	1	10	2,747
Van Zandt	234	22,155	7	2	9	2,462
Victoria	235	53,766	55	1	56	960
Walker	236	27,680	14	1	15	1,845
Waller	237	14,285	4		4	3,571
Ward	238	13,019	6		6	2,170
Washington	239	18,842	13	2	15	1,256
Webb	240	72,859	41		41	1,777
Wharton	241	36,729	36	1	37	993
Wheeler	242	6,434	4		4	1,609
Wichita	243	121,862	129	3	132	923
Wilbarger	244	15,355	14		14	1,097
Willacy	245	15,570	4	1	5	3,114
Williamson	246	37,305	18	1	19	1,963
Wilson	247	13,041	5		5	2,608
Winkler	248	9,640	9		9	1,071
Wise	249	19,687	7		7	2,812
Wood	250	18,589	6	8	14	1,328
Yoakum	251	7,344	3		3	2,448
Young	253	15,400	12		12	1,100
Zapata	253	4,352	2		2	2,176
Zavala	254	11,370	3		3	3,790
TEXAS TOTAL		11,196,730	12,258	809	13,067	857

SOURCES: 1970 Population - U.S. Census, 1970.
1972 MD's - Distribution of Physicians in the U.S., 1972, Vol. I., Chicago: Center for Health Services Research and Development, American Medical Association, 1973.
1972 DO's - Texas State Board of Medical Examiners, Directory of Licensed and Registered Physicians and Surgeons in Texas, March 15, 1972.

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TABLE 37

FRESHMAN CLASS SIZES OF TEXAS DENTAL SCHOOLS 1965-1974 AND PROJECTIONS TO 1980

	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975*	1976*	1977*	1978*	1979*	1980*
BAYLOR	96	100	100	100	100	105	105	130	130	130	130	130	150[2]	150	150	150
UNIVERSITY OF TEXAS																
HOUSTON	100	100	100	100	100	100	108	124	124	124	124	124	124	124	124	124
SAN ANTONIO	--	--	--	--	--	16	16	32	32	34	152[1]	152	152	152	152	152
TOTALS	196	200	200	200	200	221	229	286	286	288	406	406	426	426	426	426
# Increase		4	0	0	0	21	8	57	0	2	118	0	20	0	0	0
% Increase		2.04	0	0	0	10.50	3.62	24.89	0	.70	40.97	0	4.93	0	0	0

TOTAL # INCREASE (EST.) -- 230

TOTAL % INCREASE (EST.) -- 117.35%

*Projections.

[1]Projection is based on completion of dental school facilities in San Antonio.

[2]Projection is dependent upon additional capital outlay for enlarged facilities.

SOURCE: UT System Application Center for Medical and Dental Schools, Baylor College of Dentistry, and staff of Coordinating Board, Texas College and University System.

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COUNTY		1970 POPULATION	1972 MD's	1972 DO's	TOTAL PHYSICIANS	RATIO PHYSICIAN/ POPULATION
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Stephens	215	8,414	4		4	2,104
Sterling	216	1,056	1		1	1,056
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Walker	236	27,680	14	1	15	1,845
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Ward	238	13,019	6		6	2,170
Washington	239	18,842	13	2	15	1,256
Webb	240	72,859	41		41	1,777
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Williamson	246	37,305	18	1	19	1,963
Wilson	247	13,041	5		5	2,608
Winkler	248	9,640	9		9	1,071
Wise	249	19,687	7		7	2,812
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Yoakum	251	7,344	3		3	2,448
Young	253	15,400	12		12	1,100
Zapata	253	4,352	2		2	2,176
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TEXAS TOTAL		11,196,730	12,258	809	13,067	857

SOURCES: 1970 Population - U.S. Census, 1970.
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TABLE 37

FRESHMAN CLASS SIZES OF TEXAS DENTAL SCHOOLS 1965-1974 AND PROJECTIONS TO 1980

	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975*	1976*	1977*	1978*	1979*	1980*
BAYLOR	96	100	100	100	100	105	105	130	130	130	130	130	150[2]	150	150	150
UNIVERSITY OF TEXAS																
HOUSTON	100	100	100	100	100	100	108	124	124	124	124	124	124	124	124	124
SAN ANTONIO	--	--	--	--	--	16	16	32	32	34	152[1]	152	152	152	152	152
TOTALS	196	200	200	200	200	221	229	286	286	288	406	406	426	426	426	426
# Increase		4	0	0	0	21	8	57	0	2	118	0	20	0	0	0
% Increase		2.04	0	0	0	10.50	3.62	24.89	0	.70	40.97	0	4.93	0	0	0

TOTAL # INCREASE (EST.) -- 230

TOTAL % INCREASE (EST.) -- 117.35%

*Projections.

[1]Projection is based on completion of dental school facilities in San Antonio.

[2]Projection is dependent upon additional capital outlay for enlarged facilities.

SOURCE: UT System Application Center for Medical and Dental Schools, Baylor College of Dentistry, and staff of Coordinating Board, Texas College and University System.

TABLE 38

TEXAS DENTAL SCHOOL GRADUATES 1968-1974 AND PROJECTIONS TO 1980

	1968	1969	1970	1971	1972	1973	1974	1975*	1976*	1977*	1978*	1979*	1980*
BAYLOR	91	90	98	97	92	92	194[1]	122	122	122	122	122	141[2]
UNIVERSITY OF TEXAS													
HOUSTON	95	95	94	92	96	94	94	94	117	117	117	117	117
SAN ANTONIO	--	--	--	--	--	--	15	15	30	30	30	30	143
TOTALS	186	185	192	189	188	186	304	231	269	269	269	269	401

*Projected figures are based on a 6 percent attrition in entering class to graduation year.

[1]This figure includes graduates in both January and September, during the phase-in period of the three-year curriculum at Baylor College of Dentistry. In subsequent years, there will be only one graduating class per year, as in previous years.

[2]Projected figure is dependent upon additional capital outlay for enlarged facilities three years prior to this date, to allow for a freshman class of 150.

SOURCE: UT System Application Center for Medical and Dental Schools, Baylor College of Dentistry, and Coordinating Board staff.

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TABLE 39

DENTAL CARE DELIVERY IN TEXAS
1968-1973

YEAR	NO. DENTISTS[1] IN PRACTICE		NO. DENTISTS[2] NEWLY LICENSED	ESTIMATED[3] POPULATION	TEXAS[4] RATIO DEN./POP.	NATIONAL[5] RATIO DEN./POP.
1968	4,368	(3,918)	265	10,945,000	1/2506	1/1703
1969	4,531	(4,064)	252	11,144,700	1/2460	1/1693
1970	4,700	(4,088)	284	11,196,730	1/2382	1/1683
1971	4,840	(4,235)	281	11,428,000	1/2361	N/A
1972	4,864	(4,393)	258	11,604,000	1/2386	1/1682
1973	N/A		264	11,794,000	N/A	N/A

SOURCES:

[1]American Dental Association. Figures in ( ) reflect approximate numbers of Texas dentists under 68 years of age. Figures are for non-federal dentists (those not in government or military service).

[2]Newly licensed dentists are based on Texas State Board of Dental Examiner figures for in-state applicants passing the Board examination.

[3]Population Research Center, The University of Texas at Austin.

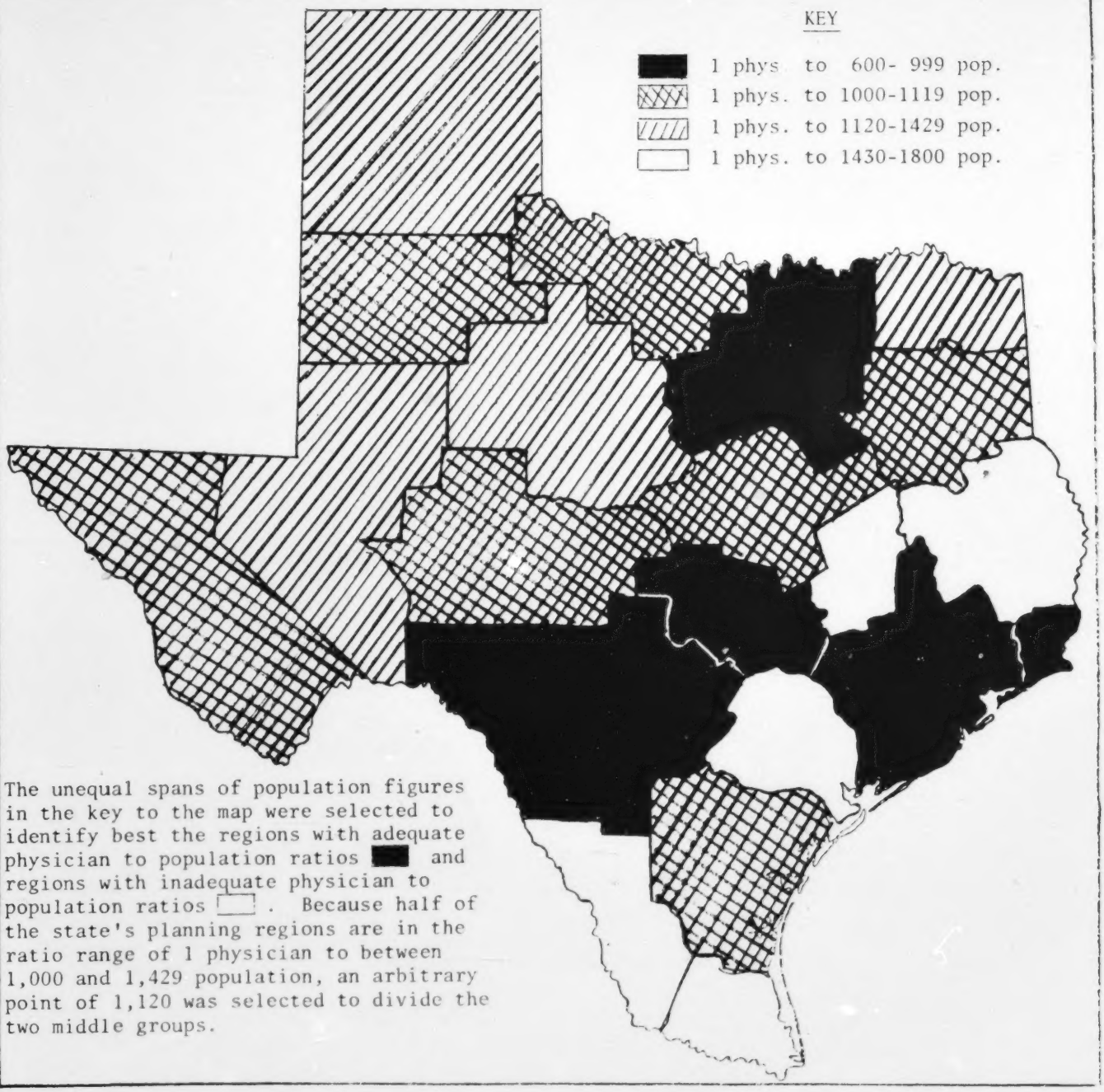
[4]These ratios are based on total numbers of non-federal Texas dentists, including those estimated to be over 68 years of age.

[5]American Dental Association, Bureau of Economic Research and Statistics.

Figure 1

235

PHYSICIAN TO POPULATION RATIOS
BY STATE PLANNING REGIONS

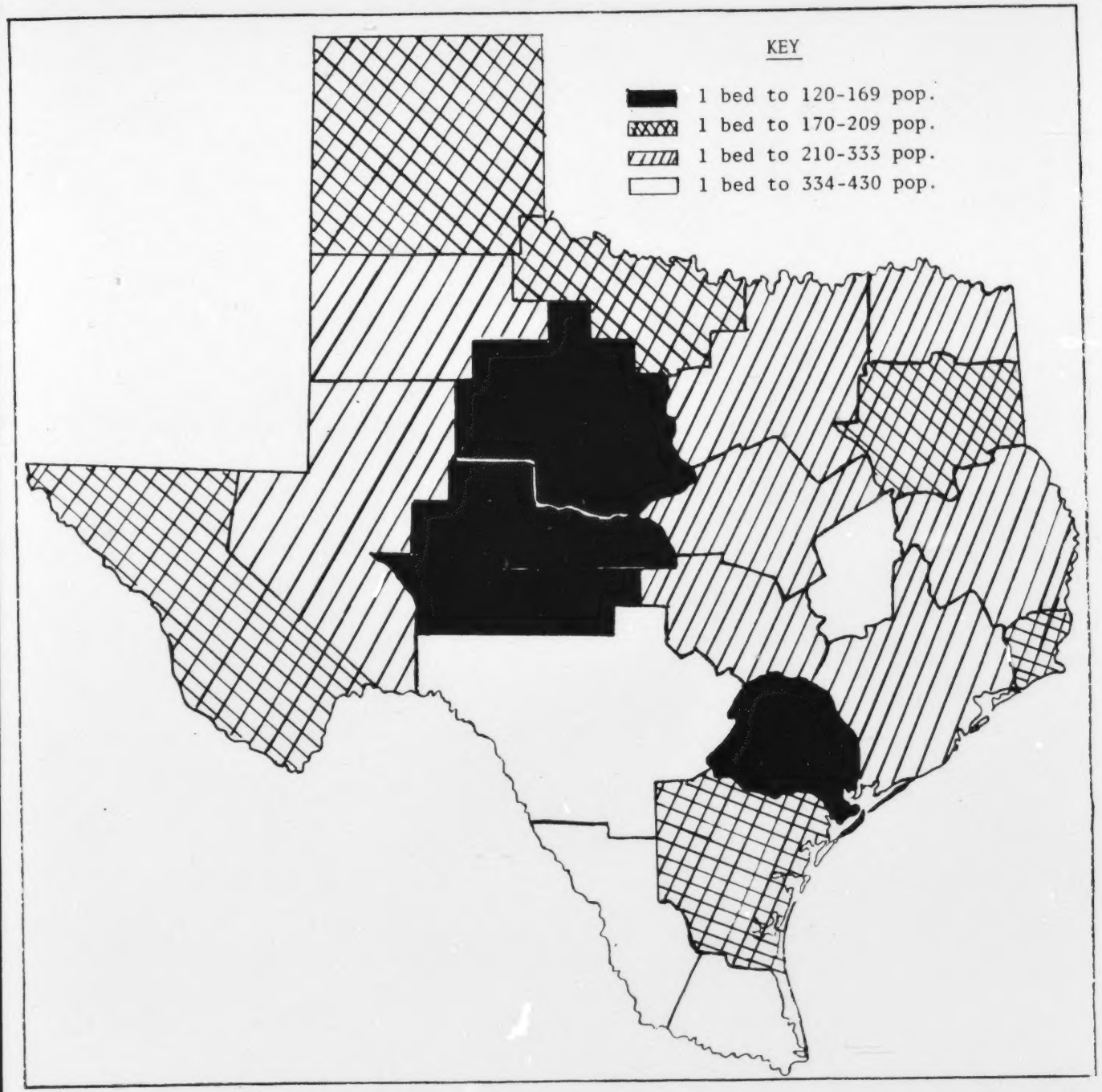


The unequal spans of population figures in the key to the map were selected to identify best the regions with adequate physician to population ratios ■ and regions with inadequate physician to population ratios □. Because half of the state's planning regions are in the ratio range of 1 physician to between 1,000 and 1,429 population, an arbitrary point of 1,120 was selected to divide the two middle groups.

SOURCE: Allied Health Manpower in Texas, 1973, A Report on Manpower Requirements, Resources and Education, Texas Hospital Association, Texas Medical Foundation, Regional Medical Program of Texas (compiled from Selected Demographic and Health Characteristics, Texas Health Data Institute, February 1971).

Figure 2

HOSPITAL BED TO POPULATION RATIOS
BY STATE PLANNING REGIONS



SOURCE: Allied Health Manpower in Texas, 1973, A Report on Manpower Requirements, Resources and Education, Texas Hospital Association, Texas Medical Foundation, Regional Medical Program of Texas (compiled from Selected Demographic and Health Characteristics, Texas Health Data Institute, February, 1971).

Figure 3

GENERAL HOSPITALS PER 1000 SQUARE MILES
BY STATE PLANNING REGIONS

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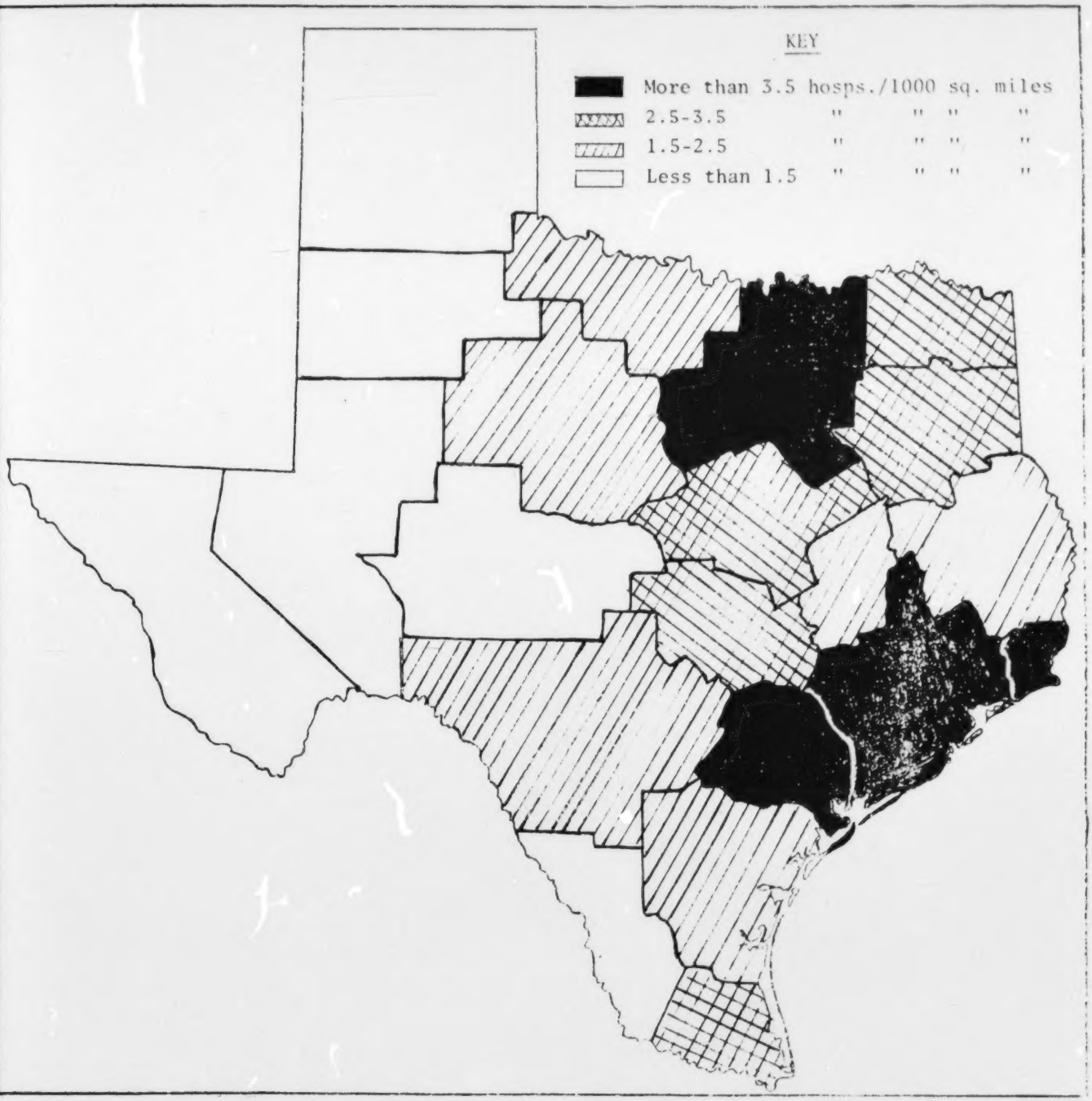


SOURCE: Allied Health Manpower in Texas, 1973, A Report on Manpower Requirements, Resources and Education, Texas Hospital Association, Texas Medical Foundation, Regional Medical Program of Texas.

Figure 4

BACCALAUREATE DEGREES AWARDED IN TEXAS
1966 - 1973
(1000's)

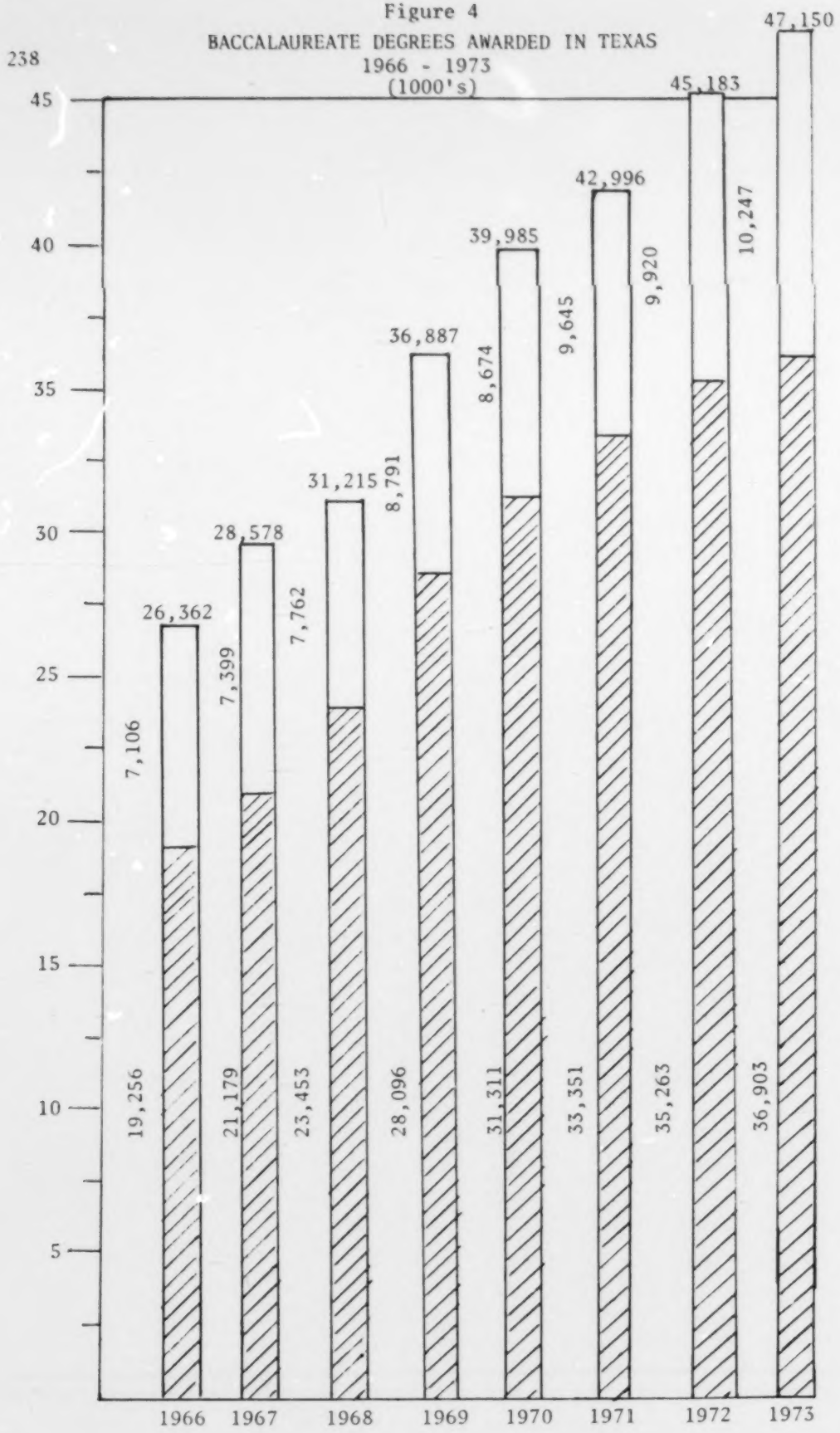
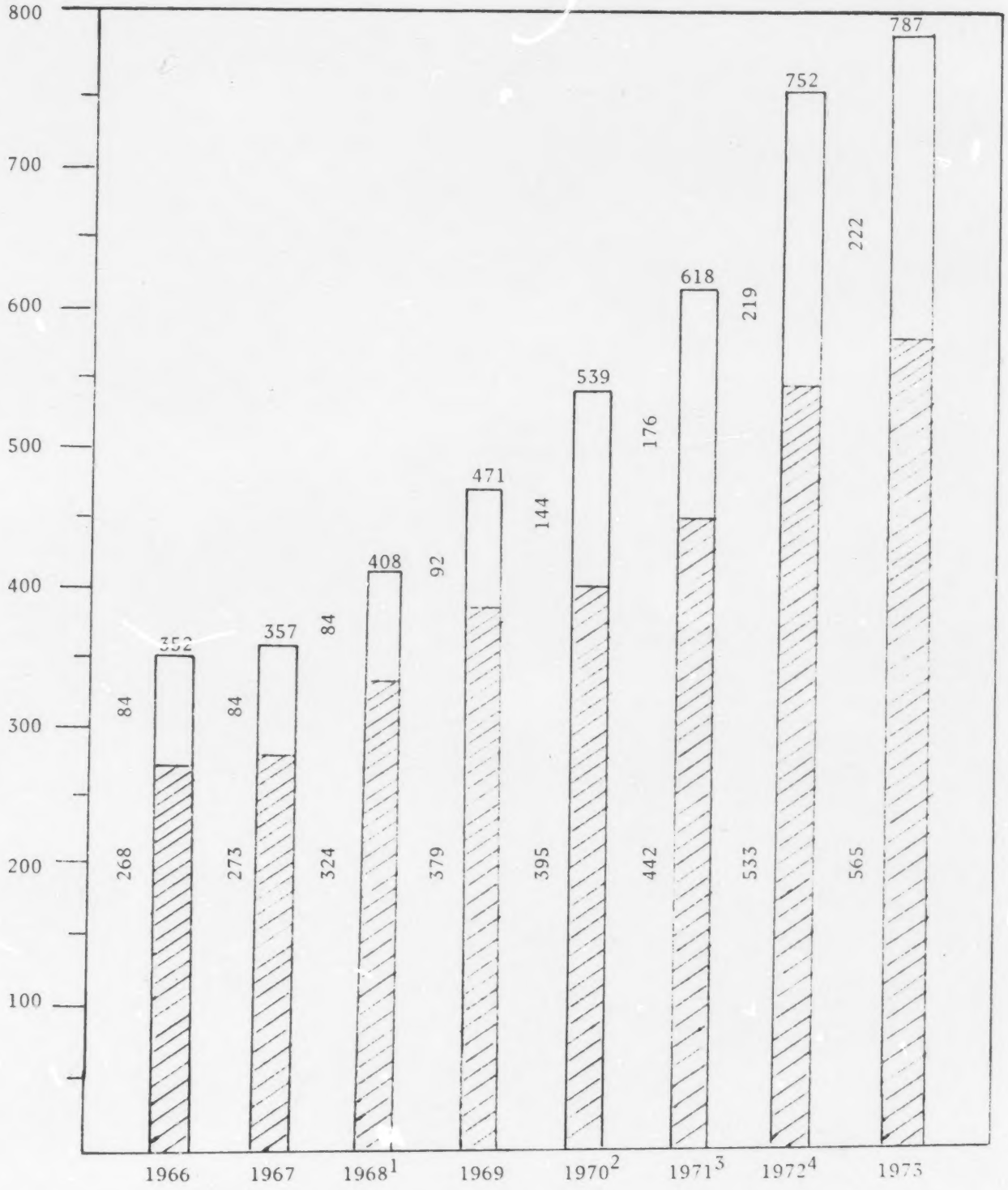


Figure 5

ENTERING FRESHMEN IN TEXAS MEDICAL SCHOOLS
1966 - 1973



Public

Private

1 UTMS - San Antonio opened
2 TCOM opened
3 UTMC - Houston opened
4 Texas Tech Med. School opened

APPENDICES

APPENDIX A

SENATE RESOLUTION 209
63RD LEGISLATURE OF THE STATE OF TEXAS, 1973

In final form, SR 209 reads:

"WHEREAS, the current trend toward over-expanding in the field of post-secondary education is a matter of common concern among the citizenry of this state; and

"WHEREAS, a continuation of this trend could diminish the quality of educational opportunity in our State; and

"WHEREAS, this Legislature is committed to the principle of "excellence" in higher education and insuring an environment in which maximum learning opportunities are guaranteed, and

"WHEREAS, this Legislature deems it advisable to declare a temporary moratorium, except for those post-secondary educational institutions already recommended by the Coordinating Board, on the creation of new public senior colleges or universities and upper-level colleges, branches or centers of public senior colleges, universities or junior colleges, as well as the expansion of any existing upper-level college, branch or center into four-year institutions, pending an in-depth study by the Coordinating Board, Texas College and University System, covering the requirements of higher education in the State of Texas until 1980 for faculties, buildings, staff, programs, facilities and other factors effecting orderly growth and development of higher education; now, therefore, be it

"RESOLVED, that the Senate of the 63rd Legislature hereby directs the Coordinating Board, Texas College and University System, to commence immediately a study covering the requirements of post-secondary education in the State of Texas until 1980 for faculties, buildings, staff, programs, facilities and other factors effecting the orderly growth and development of higher education, and to report the results of such study to this Legislature, or to the next Regular Session of the Texas Legislature; and, be it further

"RESOLVED, that, pending receipt of such study, the Legislature hereby expresses its opposition to and declares a moratorium on the creation or establishment of any new public senior college or university or upper-level college, as well as the expansion of any existing upper-level college, branch or center into a four-year institution."

TEXAS LEGISLATIVE SERVICE
5/26/73

H.B. 683
AS FINALLY PASSED AND
SENT TO THE GOVERNOR

AN ACT

1-6-18--250

relating to the creation of the State Rural Medical Education Board; to prescribe its duties; to provide for loans, grants or scholarships to students desiring to study medicine and agreeing to practice in rural areas; defining rural areas and for other purposes; and declaring an emergency.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF TEXAS:

Section 1. There is hereby established and created the State Rural Medical Education Board, which shall have the general powers and duties authorized and imposed by the provisions of this Act.

Section 2. The State Rural Medical Education Board shall consist of six (6) members, who shall be appointed by the Governor with the advice and consent of the Senate, and who shall have the following qualifications: Three (3) of the members shall be legally qualified practicing physicians, who shall have had not less than five (5) years experience in the actual practice of medicine within the State of Texas in rural areas as defined by this Act, of good professional standing and graduates of recognized medical colleges; three (3) of whose members shall consist of citizens of this State who have maintained residence for a period of not less than five (5) years in a rural area as defined by this Act.

The terms of office of members of said Board shall be for six (6) years except the terms of office of members appointed to the initial Board shall be be two for two years, two for four years and two for six years. The initial appointments shall be made to insure that there shall always be an equal number of said Board members with the same term of both qualifications as described

above. Any vacancy in an unexpired term shall be filled by appointment of the Governor with the advice and consent of the Senate for the unexpired term. The members of the State Rural Medical Education Board shall qualify by taking a Constitutional Oath of office before an officer authorized to administer oaths with this State, and, upon presentation of such oath of office, together with a certificate of their appointment, the Secretary of State shall issue commissions to them, which shall be evidence of their authority to act as such.

Section 3. The Board shall meet within 30 days after the effective date of this Act and elect a Chairman, Vice Chairman, and Secretary from among its members. The vote of the majority of Board members is sufficient for passage of any business or proposal which comes before the Board.

Section 4. A member of the Board is not entitled to a salary for duties performed as a member of the Board. However, a member is entitled to $25 for each day he is in attendance at meetings or hearings or on authorized business of the Board, including time spent in traveling to and from the place of the meeting, hearing or other authorized business, and is entitled to a reimbursement for travel and other necessary expenses incurred in performing official duties, as evidenced by vouchers approved by the Executive Secretary.

Section 5. The State Rural Medical Education Board shall have the following powers and duties:

(a) The Chairman, or in his absence the Vice-Chairman, shall preside at all meetings of the Board. In the absence of both the Chairman and the Vice-Chairman from any meeting of the Board, the members of the Board present may select one of their number to serve as Chairman for the meeting.

(b) The Board shall have regular meetings at times specified by a majority vote of the Board.

(c) The Chairman may call special meetings at any time. He shall call a special meeting on written request signed by at least three members of the Board.

(d) A majority of the Board constitutes a quorum to transact business.

(e) To make rules and regulations for its government and that of its officers and employees; and to prescribe the duties of its officers, consultants and employees.

(f) To employ a director and other such clerical employees as it may deem necessary within the limits of funds made available for such purposes. The director shall keep the books, records and accounts of the Board and shall prepare and countersign all checks, vouchers and warrants drawn upon the funds of the Board; and the same shall be signed by the Chairman of the Board. The Director shall also be the Treasurer of the Board and shall keep and account for all funds of the Board, and shall execute and file with the Board a surety bond in the sum of $20,000, payable to the State of Texas, and conditioned upon the faithful performance of his duties, said premium to be paid out of funds of the Board.

Section 6. It shall be the duty of the Board to receive and pass upon, allow or disallow all applications for loans, grants or scholarships made by students who are bona fide citizens and residents of the State of Texas and who have a desire to become physicians, and who are acceptable for enrollment in a qualified medical school. The purpose of such loans, grants or scholarships shall be to enable such applicants to obtain a standard medical education which will qualify them to become licensed, practicing physicians and surgeons within the State of Texas. It shall be the duty of the Board to make a careful and full investigation of the ability, character and qualifications of each applicant and to determine his fitness to become a recipient of such loan or scholarship, and for that purpose the Board may propound such examination to each applicant which it deems proper, and said Board may prescribe such rules and regulations

as it deems necessary and proper to carry out the purposes and intentions of this Act. The investigation of the applicant shall include an investigation of the ability of the applicant, who is unable to pay, or of the parents of such applicant, to pay his own tuition at such a medical school and the Board in granting such loans and scholarships shall give preference to qualified applicants, or whose parents are unable to pay the applicant's tuition at such a medical school.

The said Board shall have authority to grant to each applicant deemed by the Board to be qualified to receive the same, a loan, grant or scholarship for the purpose of acquiring a medical education as herein provided for, upon such terms and conditions to be imposed by the Board as provided for in this Act. The Board shall, except in those cases which it deems proper, make every effort to grant loans to applicants rather than grants or scholarships.

Section 7. Applicants who are granted loans, grants or scholarships by the Board shall receive an amount which may defray his or her tuition and other expenses in any reputable, accepted and accredited medical school or medical college or school in the United States, or a scholarship to any such medical college or school for a term not exceeding four (4) years, same to be paid at such time and in such manner as may be determined by the Board. The loans, grants and scholarships herein provided may be proportioned in any such manner as to pay to the medical school to which any applicant is admitted such funds as are required by that school, and the balance to be paid directly to the applicant; all of which shall be under such terms and conditions as may be provided under rules and regulations of the Board. The said loans, grants, or scholarships shall be based upon the condition that the full amount thereof shall be repaid to the State of Texas in cash in full with five percent interest from the date of each payment by the State on such loan, grant or scholarship or by satisfaction of other conditions of the Board or this Act. If the applicant practices his profession in a rural area

as defined by this Act the Board is authorized and shall credit one fifth of the loan, grant or scholarship together with interest thereon to the applicant for each year of such practice as certified by the Board. At the end of the second full year of practice in a rural area as provided for herein, the applicant shall be privileged to pay off the balance of the loan, grant or scholarship as the case may be with accrued interest thereon, and upon such payment shall be relieved from further obligation under his contract. Should the applicant default under his contract at any time the full principal and accrued interest plus a penalty of 10% of the outstanding balance plus attorneys' fees as defined by said contract shall be due and owing to the State.

Section 8. Each applicant before being granted a loan, grant or scholarship shall enter into a contract with the Board, which shall be deemed a contract within the State of Texas, agreeing to the terms and conditions upon which the loan or scholarship shall be granted to him, which said contract shall include such terms and provisions as will carry out the full purpose and intent of this Act, and the form thereof shall be prepared and approved by the Attorney General of this State, and shall be signed by the Chairman of the Board, countersigned by the Secretary, and shall be signed by the applicant. For the purposes of this Act the disabilities and minorityhood of all applicants granted loans or scholarships hereunder shall be and the same are hereby removed and said applicants are declared to be full lawful age for the purpose of entering into the contract hereinabove provided for, and such contract so executed by any applicant is hereby declared to be a valid and binding contract the same as though the said applicant were of the full age of twenty-one (21) years and upward. The Board is hereby vested with the full and complete authority and power to sue in its own name any applicant for any balance due the Board upon any such contract.

Section 9. It shall be the duty of the Board to contact and make inquiry of such of the medical colleges or schools as herein provided as it deems proper, and make such arrangements and enter into such contracts, within the limitations as to cost as herein provided, for the admission of students granted loans or scholarships by the Board, such contracts to be approved by the Attorney General of this State, and money obligations of such contracts so made by the Board with any such college shall be paid for out of the funds to be provided by law for such purposes, and all students granted loans, grants or scholarships shall attend the medical school with which the Board has entered a contract, or any accredited medical school or college in which said applicant may obtain admission, and which is approved by the Board.

Section 10. The Board shall promulgate and adopt rules and regulations for the cancellation of any contract made between it and any applicant for loans or scholarships upon such cause deemed sufficient by the Board. And the Board shall have authority to cancel such contracts which it may lawfully cancel made with any of the colleges or schools as herein provided.

Section 11. All payments of funds or loans or scholarships hereunder shall be made by requisition of the Board signed by the Chairman and the Secretary directed to the Comptroller of the Public Accounts, who shall thereupon issue a warrant on the Treasury of the State of Texas for the amount fixed in the requisition and payable to the person designated thereon, which said warrant upon presentation shall be paid by the Treasurer out of any funds appropriated by the Legislature for the purpose provided for under this Act.

Section 12. The Board may contract with any insurance company or companies licensed to do business in Texas for issuance on the life of any applicant an amount sufficient to retire the principal and interest owed under a loan made under the provisions of this Act, the costs of the insurance shall be paid by the student borrower. No contract for insurance provided for in this section may

be approved except by the Board during a regular meeting attended by a quorum of the total Board membership.

Section 13. The Board may extend the time for beginning repayment for unusual or financial hardships with approval of the Attorney General.

Section 14. Upon any default as provided for herein the Board shall turn the same over to the Attorney General for prosecution and suit for the remaining sum shall be instituted by the Attorney General, or any county or district attorney acting for him, in the county of the person's residence, the county in which is located the institution at which the person was last enrolled, or in Travis County, unless the Attorney General finds reasonable justification for delaying suit and so advises the Board in writing.

Section 15. The Board may appoint advisory committees from outside its members as it deems necessary to assist in achieving the purposes of this Act.

Section 16. In achieving the goals outlined in this Act and the performance of functions assigned to it, the Board may contract with any other State governmental agency as authorized by law, with any agency of the United States, and with corporations, associations, partnerships, and individuals.

Section 17. The Board may accept gifts, grants or donations of real or personal property from any individual, group, association, or corporation or the United States, subject to limitations or conditions set by law. The gifts, grants, or donations of money shall be deposited in the Texas Rural Medical Education Board fund, separately accounted for, and expended in accordance with the specific purposes for which given and under such conditions as are imposed by the donor and as provided by law.

Section 18. All transactions under this Act are subject to audit by the State Auditor.

Section 19. Annual Report. The Board shall make a report of the operation of the State Rural Medical Education Board to the Governor annually and to the

Legislature not later than December 1, prior to the Regular Session of the Legislature.

Section 20. Rural Areas. Rural areas as defined in this Act shall mean residence in or intention to practice in a county of the State of Texas which according to the last preceding Federal Census had a population of less than 25,000.

Section 21. The importance of this legislation and the crowded condition of the calendars in both houses create an emergency and an imperative public necessity that the constitutional rule requiring bills to be read on three several days in each house be suspended, and this rule is hereby suspended, and that this Act take effect and be in force from and after its passage, and it is so enacted.

PRESIDENT OF THE SENATE

SPEAKER OF THE HOUSE

I hereby certify that H.B.No. 683 was passed by the House on May 16, 1973, by the following vote: Yeas 125, Nays 7.

CHIEF CLERK OF THE HOUSE

I hereby certify that H.B. No. 683 was passed by the Senate on May 24, 1973, by the following vote: Yeas 31, Nays 0.

SECRETARY OF THE SENATE

APPROVED: _____
Date

_____
Governor

APPENDIX C[1]

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Summary of Conclusions and Recommendations

Conclusion: That biomedical research has contributed in substantial ways to longer life and better health for all Americans. Impressive progress continues to be made against the formidable health problems remaining. Nevertheless, biomedical research is under attack, sharing with all science much of the blame for problem-causing technologies and for failure to cure social ills.

1. Recommendation: That the nation adopt a policy of supporting more, rather than less, biomedical research, in full recognition of the fact that no other course can offer hope for ultimate solutions to health problems.

That the public supports science as a means to an end, not as an end in itself. But applied research leading to practical results, it should be made clear, can go only so far without new knowledge from basic research and will falter if it exceeds its science base.

2. That the public be made aware of the payoffs from basic research through cost-benefit analyses in which life saving results are traced to their origins.

That biomedical research and medical education are mutually dependent and mutually beneficial.

3. That medical schools and their affiliated hospitals continue to be the principal sites of biomedical research effort in this country, thus enhancing the training of physicians and other health workers, the care of patients, and the research itself.

That the President's Task Force on Science Policy is commendable for its emphasis on the importance of scientific leadership to the achievement of national goals (2).

4. That the President, in the spirit of his Task Force's recommendations in support of science, endorse an unequivocal statement of the federal commitment to biomedical research.

That the environments in which productive research can be conducted vary greatly and that the deployment of efforts should be guided by the principle of maximum yield for funds invested.

5. That maximum productivity be sought through encouragement of the creative mind and of creative interaction, to be achieved through freedom of choice in careers and residence.

That the President's Task Force, in extolling the free-enterprise system as a science resource, failed to give due credit to nonprofit institutions for the conduct and support of live saving discoveries.

6. That national science policy take full cognizance of the productive relationship of the federal government and academia and that ways to improve this relationship be explored. Consideration should be given to the potentialities of the university consortium of voluntary cooperative efforts to solve a given problem in multiple settings through shared awards.

That the National Institutes of Health is the main federal supporter of research and development at educational institutions and that its parent agency, the Department of Health, Education, and Welfare, accounts for over half of all federal aid to academic science.

7. That the Association of American Medical Colleges engage actively in shaping

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[1]Association of American Medical Colleges, A Policy for Biomedical Research, Report of an Ad Hoc Committee of the Council of Academic Societies, AAMC, reprinted from Journal of Medical Education (Washington, D.C.: August, 1971).

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national biomedical research policy, particularly in respect to the important role of NIH in science support.

That the federal government has become the main source of funds for biomedical research, providing nearly two dollars for each one from the nonfederal sector. In addition, its programs support research training, facilities, special resources, and the institutions themselves.

8. That the bodies of the executive and legislative branches of the government concerned with the making of science policy be urged to continue federal appropriations for biomedical research as vital to the national health effort and in the public interest.

That the rate of increase in biomedical research support has not kept pace with that of the gross national product, the federal budget, or national health care. Recent increases have been more than offset by rising costs so that the trend in constant dollars is level or downward. Meanwhile, the phasing out of research construction and the reduction of training programs bode ill for the future.

9. That the national policy for biomedical research assure support at levels sufficient to engage all well-qualified brainpower and that consideration be given to expansion at a rate determined by widening research opportunities.

That a high proportion of graduate trainees in medical schools (about 60 percent) would be unable to continue their extra training, vital to research and teaching, if their stipends were changed to loans, as contemplated by the Office of Management and Budget.

10. That the Administration and the Congress be urged to continue federal programs providing fellowships and other stipends for advance training in the health sciences and clinical specialties.

That various means of support for biomedical research, ranging from the individual project grant or contract to the program-project and institutional grant, have their place in meeting program objectives of both supporting agencies and performing institutions.

11. That the individual project grant, awarded through peer review, continue to be the primary instrument of biomedical research support. An expanded system of program-project support should be addressed to problems of high relevance.

That the biomedical research to be supported is of two main types—basic and applied. No fixed ratios can be stipulated, but allocations should be based on research opportunity and on national priorities among health problems.

12. That new ways be sought to meet the various needs of biomedical research and training, including consideration of a department of health or a department of science and education. Peer review is strongly endorsed, but the review mechanism should be streamlined.

That important tasks and questions face the AAMC and the CAS. These include determination of support levels for the next decade according to the recommended principle of full utilization of brainpower.

13. That the AAMC and the CAS undertake or sponsor studies to demonstrate the contributions of basic research, to delineate areas in which target research under contract would be productive, and to improve health care delivery.

That the implementation of biomedical research policy requires effective communication at all levels. There is particular need for more public information on the nature, the goals, the implications, and the costs of medical science.

14. That a major effort be made to improve the general public's and their leaders' understanding of biomedical research through development of a communications system which would in turn be part of a broader network linking all persons and organizations concerned with matters of health.

APPENDIX D

ADVISORY COMMITTEE ON MEDICAL AND DENTAL EDUCATION

COORDINATING BOARD
Texas College and University System

Educational Goals and Policies to Achieve
State Health Care Objectives
A Subcommittee

The Summary of the Chairman
John D. Wilbanks, D.D.S.

An Introductory Statement

Since the Chairman of this Subcommittee felt that a study of Health Care Objectives and the Educational Goals and Policies would be enriched by informal conversations with a variety of people, both lay and professional, meetings and interviews were held by him with:

Mrs. Ronnie Broom
Dr. Stanley Burnham
Dr. Robert Dixon
Mr. and Mrs. William Duncan
Mrs. Maria Elena Flood
Dr. Robert C. Hickey
Dr. L. M. Kennedy
Dr. and Mrs. Joe Leach
Mrs. M. Martinez
Professor Milton Siegel
Dr. Joseph Smiley
Dr. Judson Williams

Health Care Objectives as stated by the Advisory Committee of the Coordinating Board, Texas College and University System were emphasized as well as directives to the Advisory Committee from the Coordinating Board.

Obviously, conversations invariably wandered beyond "Educational Goals and Policies" to include personal points of view and observations. However, a variety of comments have been included because it was thought that consideration of problems and attitudes as stated by a variety of persons would offer background for a clearer statement of goals and objectives.

Recurring Conversational Themes

- We need a system or method to get more physicians and dentists in the underserved areas.
- There should be a centrally operated computer system to receive data from communities, institutions, schools, students and practitioners. This should be a sophisticated system including information such as number of specialists, ages, and like data.
- More physicians and dentists are needed to serve both well-to-do and the poor.
- It was believed that health care for the elderly, the retarded, the handicapped and poor is inadequate.
- Preventive medicine and dentistry should be promoted vigorously.
- Texas needs a strong school health education program from grade school through college to educate people concerning the benefits to be derived by following healthful practices as opposed to self-abuse and neglect.
- Somewhere in medical and dental training there should be included education of professionals in the humanities.
- Continuing education should be encouraged and recognized to help assure that the public will be served by up-to-date practitioners.

- A number of non-professionals felt there should be auxiliary practitioners trained to work with physicians to help alleviate the difficulty in securing appointments for examination and treatment, and to decrease the time spent by patients waiting in offices.
- Research programs in health care delivery should be established.
- We have the knowledge and resources to provide the best health care in the world. The coordinated use of our existing agencies and resources should be a major objective. Our problem may be how to best use the system we already have.

Tentative Recommendations as Prepared by the Subcommittee Chairman*

- Medical and dental schools in Texas must take more initiative and exercise more leadership in helping to get practitioners to underserved areas. Special effort should be made by medical and dental schools to motivate students to practice in these areas.
- Medical and dental schools should attempt to coordinate plans for health care teams, including auxiliary personnel, to locate in underserved rural and urban areas.

*Edited to prevent repetition.

- We suggest the development of some sort of University or state operated computer center to match the practice interests of dentists and physicians with shortage areas in the state. Such a system should include information about the community size, geography, number of physicians and dentists, number of specialists, cultural features, school information and so forth.
- Since greater efficiency in the use of our health manpower is an acceptable objective, we recommend that our medical schools develop inter-professional programs designed to improve communication between each professional area which, in turn, would serve to improve patient care.
- Experimentation with the use of airplane and helicopter transportation in delivery of health care might be considered by Texas Tech School of Medicine located as it is in a geographic area of vast distances.
- Other medical and dental colleges might develop pilot programs using mobile units for the delivery of health care to underserved urban and nearby rural areas.
- We recommend that our medical and dental schools develop experimental programs to discover new approaches to the delivery of adequate health care to the elderly, handicapped, and poor.

- Since transportation is a severe problem for many elderly, the handicapped, and the poor, we recommend a program directed to getting these people to physicians and dentists.
- Regionalization of medical and dental care delivery systems might be considered with the establishment of such centers in larger cities and/or in medical schools.
- Medical schools should be urged to continue the expansion of programs in medical schools toward the education of larger numbers of physicians in primary care.
- We suggest the expansion of educational preparation in premedical and predental curricula as well as in medical and dental schools, themselves, through offerings of more courses in the humanities, the behavioral and social sciences.
- More emphasis should be placed upon counseling medical and dental school applicants to inform them of the large number of opportunities available to them in areas related to dentistry and medicine.
- A study should be undertaken to re-examine the duties of assistants and other auxiliary health personnel as these relate to state laws.

- Cooperation of specialty boards should be encouraged to help control the number of physicians or dentists entering the various specialties.
- We recommend a broad approach to the general public in health education with some form of health maintenance for all citizens including programs in nutrition, emotional health, and other preventive measures.
- We also recommend health educational programs in the school system directed toward eliminating abuse and neglect which lead to many health problems.
- We recommend the teaching of more preventive medicine and dentistry in our medical and dental educational institutions. These should include emphasis on nutrition and emotional health.
- We recommend continuing education programs for all physicians and dentists and post-graduate instruction for all health care personnel.
- We suggest tuition and/or scholarship incentives for students who agree to practice in small communities for two years or more.

- We recommend the encouragement of research in health care delivery and related fields.
- We also recommend that an educational goal should be the training of qualified auxiliary personnel who would work under the supervision of physicians and dentists.
- We recommend that efforts be made to adjust laws to suit present needs.

A Special Recommendation by the Subcommittee Chairman Concerning Colleges of Dentistry

- "We recommend that the Coordinating Board, Texas State College and University System, reconsider their request that Baylor increase the size of its freshman class by 50 resident students.
- "We further recommend that this figure be reduced to a number that would permit Baylor to accept a maximum of 100 students per year, and
- "That Texas (Houston) and Texas (San Antonio) also be scheduled to accept 100 freshmen annually.
- "The above policy would graduate 300 annually compared to 182 as recently as 1972 for an increase of 118 per year. This would be a more reasonable increase; it would be less of a tax burden; and the additional 118 dentists would, I believe, meet the requirements of our growing Texas economy. Further note should be made of the fact that the productivity

of the majority of dentists has been rising steadily."

A Random Sample of Conversational Comments

- The state's investment in medical and dental schools and the cost of educating physicians and dentists must be looked at in terms of the return to taxpayers.

- No matter how many are trained, no matter how good are the schools, our citizens will not receive adequate health care unless a system is developed for the distribution of physicians, dentists and auxiliary personnel, along with the improvement of methods for health care delivery and better and greater use of auxiliary personnel.

- It is very difficult to estimate the ratio of dentists and physicians to the population that might be "adequate" in 1980. For example, the productivity of dentists has been rising steadily.

- States have no way of controlling how many specialists are graduating. Thus many areas in the state are in short supply either for specialists or for physicians in primary care. Logically, if the state knows where physicians are needed, they should train students willing to go there.

- How attractive are scholarship incentives? Are there many programs now available? Are they actually attracting medical and dental students to areas where the need is great?

- It would be desirable if 50 per cent of the medical school graduates were directed to primary care.
- Can students be motivated to serve in understaffed areas?
- We need some lesser trained personnel who can help deliver health care to rural areas, the indigent, the elderly, the handicapped. Is it possible to develop more highly trained auxiliary health personnel to work under the supervision of physicians and dentists?
- The Armed Services have successfully used medical and dental corpsmen.
- We should try out new ideas of delivery of health care and then decide upon a course of action.
- As professional groups, physicians and dentists may not have the best view of the needs and problems faced by the public regarding health care.

- The problem is how to educate the uneducated to use the system that is already available.
- Perhaps teams of three physicians, one dentist, and supportive personnel might be recruited for smaller areas.
- Health care facilities may be available, but are they accessible?
- What attention is being devoted to streamlining the curriculum between the medical and dental schools?
- The end product should be the criterion for measuring the quality of dental and medical education programs.
- Improved education should be made available for physicians and dentists regarding their various roles and services in communities.
- Teaching needs to be more realistic in regard to the ideal and the real.
- Many persons are overwhelmed by what it costs to stay healthy or to become healthy.
- How well are our citizens educated regarding needs for or value of prevention?
- Should there be concentration on early detection and screening?
- Dental and other health problems have cultural backgrounds and thus become educational problems.

- The report of the Advisory Committee on Medical and Dental Education should be shared by the Coordinating Board with the Texas Education Agency.
- The rate of advance in knowledge and technology is so rapid physicians and dentists must remain students throughout their professional careers or face partial obsolescence in five to ten years.
- From research oriented university medical and dental centers have come new knowledge and techniques which have revolutionized the control of disease within a single generation.
- What are the problems regarding health auxiliary personnel? What are the benefits to patients if auxiliary personnel are used more often?
- What kind of auxiliary health personnel are we talking about? What are the legal liabilities related to their use?
- A research project might be devised for a controlled program in medical and dental schools to determine what trained assistants can do. Perhaps this should be established in cooperation with the Boards of Medical and Dental Examiners and with appropriate agencies.

- We should know the needs and problems before we suggest the solutions.
- What kind of legislation do we need to provide health care and to meet health care objectives? Leadership must come from the health care professions.
- We need a coordinated statewide health care and health manpower policy in Texas. There should be a long term phasing program to achieve health care goals.
- We have institutional planning with no overall policy or plan. We need an overall central planning committee. Perhaps this should reside at the Coordinating Board headquarters.
- Coordinated planning should give the greatest benefits in terms of federal and state dollars spent.
- We have many good ideas in programs -- the problem is fear and function in administration.
- Consumers are now having a say in health care.
- There are 24 health planning agencies in Texas.
- We are planning toward what communities want and need in health care. Planners want comprehensive care delivery systems.

- Everybody in America should have some way to protect themselves against the ravages of chronic or catastrophic illness.
- If the number of physicians is not the problem, then increasing the number of physicians will not be the solution. Disorganization and fragmentation of delivery of medical care is our problem.
- There cannot be any compromise when it comes to the right of every man, woman, and child in America to health care. Even with dollars, there is no guarantee that care will be where it is needed or that it is of high quality. Our objectives should be quality and availability.

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* Random comments were chosen and edited to avoid as much duplication as possible and yet to cover, with the statement of Recurring Conversational Themes and Recommendations, all areas touched upon in conversations and conferences. Copies of the total report are available in the office of the Program Development Division, Coordinating Board, Texas College and University System.